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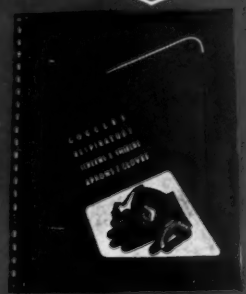

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The Thames Foundry

The creation of a new foundry is always a matter of outstanding interest in our industry, especially when of great size, because it focuses attention on trends, accomplishments and economics. This week will see the first stages of production at the Thames Foundry—the older one is, of course, the "Dagenham"—of the Ford Motor Company, Limited, and metal will run from one of the four 108-in. dia. hot-blast cupolas, ultimately to provide for the daily output of about 400 tons of iron castings. The moulds for the trial castings, about 32 in number, will be made on two lines of eight moulding machines. The automatic servicing and operating of these machines is noteworthy. A finger pulls a moulding box—a substantial steel casting—from the conveyor to the moulding-machine plate. Next, the filling with sand, number of jars to be given, scraping off of the surplus sand, turning over and placing on the conveyor on the opposite side of the machine all are effected by push-button control.

The main foundry building, 1,200- by 180-ft., is carried on piles, of which (for this and an auxiliary shop) 5,500 have been used, because the land is marshy. This state of affairs is responsible for the placing of the actual foundry on the first floor, with sand spill conveyors and most of the amenity and maintenance services beneath it. The ceiling of the foundry is strongly constructed and wherever possible, machinery is suspended from it, to allow much clear room beneath. Much thought has been given to the ventilation of the shop, and plant has been installed for changing the air completely every eight minutes. This involves taking in no less than 1,200,000 cub. ft. per minute.

Enormous quantities of sand are required hourly, yet the whole of its movement and preparation is completely automatic. The bond and other ingredients are introduced in the form of a slurry and the whole of the weighing, measuring and mixing cycle is controlled through the insertion of a punched card into a slot. Many other examples could be cited of automatic controls which have been instituted, but these must be left to a later detailed description. It is interesting to dwell on the fact that to take care of the functioning of 16 moulding machines and coping with their output will require about 1,800 workpeople. Employees are particularly well cared for, the 'bus station is exactly opposite an entrance leading to the changing and bathrooms, whilst the main canteen has seating accommodation for 700. We congratulate the Ford engineers on having turned out a magnificent castings-manufacturing plant (costing £8,000,000) in the record time of 2½ years from the driving of the first pile.

G

Dr. Hurst Retires

As briefly reported last week, the retirement is announced on health grounds of Dr. J. E. Hurst, deputy chairman and managing director of Bradley and Foster, Limited, Darlaston, as from December 1. Dr. Hurst together with the late Mr. G. T. Lunt, was probably more than anyone else responsible for the growth of the Bradley and Foster Group of companies over the past 30 years. Following service with a number of companies as a metallurgist, he became technical adviser to Bradley and Foster, Limited, in 1926, technical director in 1934, managing director in 1949 and deputy chairman in 1952. Throughout his working life Dr. Hurst has been associated with ironfounding and the metallurgy of cast iron. His many activities include the development of the centrifugal casting process, heat-treatment and nitrogen hardening of cast iron and the production of alloy cast irons. He has been closely associated with numerous technical associations and has presented a large number of papers on a variety of metallurgical subjects. His services in this connection were recognized by his election as president of the following:— The Institute of British Foundrymen, British Cast Iron Research Association, Institute of Vitreous Enamellers, National Trades Technical Societies and the Staffordshire Iron and Steel Institute. In 1939, he was awarded a degree of Doctor of Metallurgy (D.MET. *Honoris Causa*) of Sheffield University and in 1956 of Doctor of Engineering (D.ENG. *Honoris Causa*) of Karlsruhe, Germany. Further recognition of his great services to industry was made in 1953 when he was made a C.B.E. (Civil) in the Coronation Honours List.

Dr. Hurst has taken a leading part in public life in the City of Lichfield where he resides. He was made a J.P. in 1942, was Sheriff of the City in 1946 and Master of the Worshipful Company of Smiths, in 1953. Dr. Hurst has been Chairman of the Lichfield Johnson Society for a number of years. His good humour and understanding has endeared him to his wide circle of colleagues and it is satisfying to know that he will remain in an advisory and consultative capacity and will also continue as a director of the parent company, the Staveley Coal and Iron Company, Limited.

European Foundry Apprentices' Competition

Two telegrams have been sent to Germany by Mr. N. P. Newman, chairman of the Council of Ironfoundry Associations, acting on behalf of UK founders. The first was addressed to Philip Roberts, Richard Spencer and Edward Sykes, who are this country's contestants in the above competition, being held this week in Stuttgart. It read:—

"On behalf of the British ironfounding industry I send you best wishes for your success in the European Foundry Apprentices' Competition."

The second telegram was to Mr. Hœvelmann, chairman, Wirtschaftsverbandes Giesserei-Industrie (the representative of the European Committee of Foundry Associations under whose auspices the arrangements for the competition have been made), as follows:—

"On behalf of the British ironfounding industry I send best wishes for a successful week in this first European Apprentices' Competition."

The result of the competition is expected on Saturday next and it is hoped to print a report in this JOURNAL at an early date.

Mr. L. E. DYER and Mr. C. G. MONK have been appointed directors of Enfield Rolling Mills, Limited.

Luncheon

LIGHT METAL FOUNDERS' ASSOCIATION

The annual luncheon of the Light Metal Founders' Association was held last week at the Savoy Hotel, London; Mr. W. Brown, chairman of the Association, presided. The toasts of "The Queen" and "Her Majesty's Ministers" were proposed by Mr. Brown, and Mr. W. J. Taylor, C.B.E., D.L., J.P., M.P., Parliamentary Secretary, Ministry of Supply, responded to the latter. The Rt. Hon. Viscount Chandos, P.C., D.S.O., M.C., proposed the toast "The Association" and a response was made by Mr. H. G. Herrington, C.B.E., F.R.AE.S.

Dinners

FEDERATION OF LIGHT METAL SMELTERS

Mr. B. Endlar presided over the annual dinner of the Federation of Light Metal Smelters, which was held at the Trocadero last Thursday. The speakers were Mr. H. G. Herrington, C.B.E., Mr. R. Hahn, Mrs. J. Jakobi and Mr. S. E. Clotworthy. At the high table were Mr. D. L. Haviland, Mr. W. Brown, Mr. V. P. Harries, Mr. Murray Shaw, Mr. Miles C. Elton, most of whom were accompanied by their ladies. During the evening, a presentation was made to Mr. A. Ross, who for many years had been the secretary of the Federation.

During the dancing which followed there were intervals for songs by Joyce Gartside (soprano) and Harold Blackburn (baritone).

INTERNATIONAL COMMITTEE OF FOUNDRY TECHNICAL ASSOCIATIONS

Dr. A. B. Everest entertained to dinner at the Park Lane Hotel, London, W.1, the past-presidents of the International Committee of Foundry Technical Associations. Those present included Mr. A. Brizon (France), Mr. R. Deprez (Belgium), Mr. V. C. Faulkner (Great Britain), Dr. G. Schwietzke (Germany), Mr. F. W. E. Spies (Holland) and Mr. M. Vuilleumier (Switzerland) and the honorary secretary, Mr. G. Lambert.

Raw Materials Prices Fall Again

October was the sixth consecutive month for a fall to be recorded in the prices of manufacturing industry's raw materials. They are now at the lowest level since the end of 1954. The index for all basic materials (except fuel) used in non-food manufacturing industry declined by 2.4 points to 148.8 during the month (June, 1949 = 100). This compares with a peak during the Suez crisis last year of 161.6.

Among commodities to show significant falls in October were non-ferrous metals (except aluminium and nickel). Copper, which on average was 4.5 per cent. lower in price than in September, rallied a little towards the end of the month.

ORDERS valued at more than $10,000,000 for the two largest turbo-generators ever purchased by a Canadian utility have been awarded to C. A. Parsons & Company, Limited, Newcastle-upon-Tyne, by the Ontario Hydro-Electric Power Commission.

The two units, each with a capacity of 300,000 kW., are the first of those required for the two recently-announced 1,800,000 kW. thermal generating stations planned for the heavily-industrialized Toronto-Hamilton area during the next 10 years.

Leicester Founders build their Own Plant

Improvements at Richards Foundries, Limited

Speaking generally, now that the "make do and mend" enforced on firms by post-war shortages is a thing of the past, the building of foundry plant by founders themselves is to be deprecated—the reason being that it is a specialist job best left to specialists. Furthermore, when a founder claims that an improvised piece of equipment "cost but a fraction of the purchase price of the specialist-made article," he is nearly always telling an untruth, because real overheads cannot properly be assessed in such cases—although such a deviation from the truth may not be revealed in a firm's balance sheet. An exception to this dictum can, however, be made in the cases sited in the account which follows, for Richards of Leicester, besides being founders, are constructional engineers of long standing and world-wide reputation, with extremely versatile capabilities. Thus, the story of why and how they built their own sand plant after "throwing out" the old installation, and reports of other foundry developments at these works, makes interesting reading.

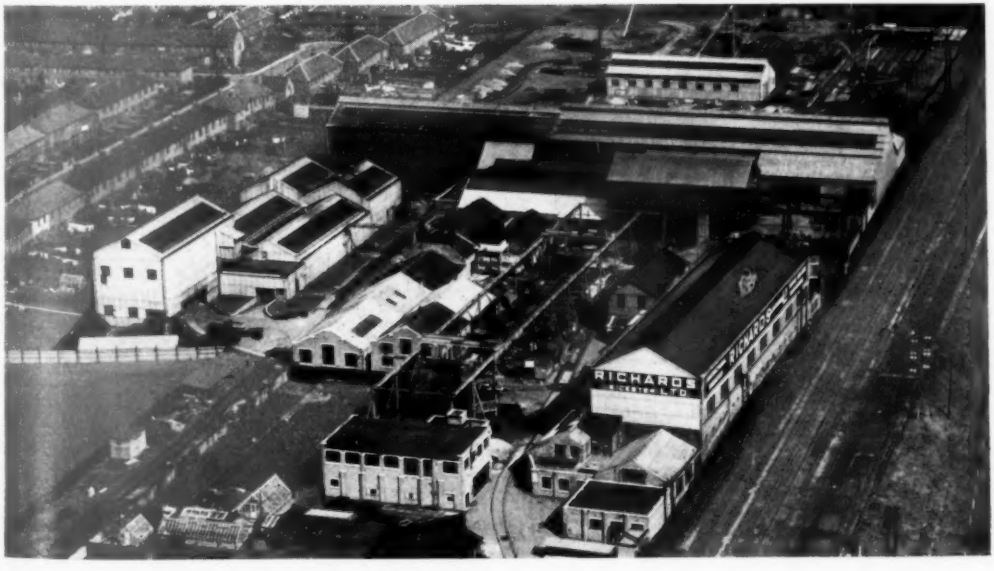
Phoenix Ironworks (Fig. 1) of Richards (Leicester), Limited, the public company which now embraces Richards Foundries, Limited and Richards Structural Steel Company, Limited, was founded by the Richards family, who are still the principal shareholders, over 110 years ago. The firm's productions include: Meehanite high-duty, and grey-iron castings; constructional steelwork; bridges; steel fabrications, and general heavy mechanical engineering work. The larger types of castings produced are hand- or Sandslinger-moulded and the smaller ones—of the repetition variety—are machine moulded. There are both wood and metal patternshops.

SAND PLANT

Until recently, the sand plant in the firm's mechanized foundry was of the conventional type (Fig. 2) and had served reasonably well, except that maintenance was heavy—mainly because structures were on the flimsy side for standing up to the heavy duty required in a high-production foundry. Thus, following a series of visits to other foundries in many countries but principally in the USA, Mr. W. Harry Richards, the director responsible for foundry operations, decided that the idea of taking sand for long trips around foundry buildings (on which the old scheme seemed to be based) was quite unnecessary and a complete waste of available space. He also decided that for their purpose the continuous mill was not suitable and that for the really efficient mixing of sand a batch-type mixer was necessary.

Thus, the existing sand-treatment plants in both Richards' foundries were discarded (that shown in

FIG. 1.—*Aerial photograph of Richards (Leicester), Limited: the firms' jobbing foundry is the part on which the name is painted, and the mechanized foundry is housed in the building on the opposite side.*



Leicester Founders build Plant

Fig. 2 being sold as a complete entity). New equipment to the firm's own designs has since been installed, that in the mechanized foundry (Fig. 3) being dealt with first. The basic idea has been to "go up into the air" with the plant instead of around the foundry floor, and a neat, compact assembly, occupying only 50 per cent. of the space of the old plant, is the result. Although not apparent from the illustration reproduced, items 13, 14 and 16 in Fig. 2 took up so much room that with their elimination in the new scheme (Fig. 3) there is room for another dozen floor moulders to work. Furthermore, the underground conveyor (Fig. 2, item 11) beneath the moulding machines has been eliminated in the new set-up. This was because it was felt that moulders tended to waste sand. When any sand spilled fell through the floor grid to the underground belt, it did not seem to matter to them that they should be economical with sand at their machines. With the new system, if any sand is spilled around the machines, the moulders quickly shovel it up into the boxes they are making; there is no mess and, more important, no waste.

As shown in Fig. 3, the knock-out for moulds cast on the roller-conveyor line is adjacent to a large (80-ton) sand storage-hopper, to which sand is delivered by a bucket elevator from the knock-out; a magnetic separator and a rotary screen being included in this part of the cycle, the latter being situated above the hopper. The storage hopper is so arranged as to discharge sand directly into the skip-loader for the mixer, and new-sand, coal-dust or other additions are made at this point. After milling, the sand passes through an aerator during discharge from the mixer and thence is carried, first on an inclined belt (52-ft. long) then on a short transfer belt (17-ft. long), and finally on a horizontal belt above the line of moulding machines. This belt (46-ft. long) carries a movable plough so that sand from the belt can be directed at will into any one of the six 4-ton machine hoppers below. Backing sand and facing sand are prepared in the same mixer and directed by manipulation of the plough into appropriate machine hoppers, there being a backing-sand hopper over each moulding machine and a "shovel-out" facing-sand hopper for each pair of machines.

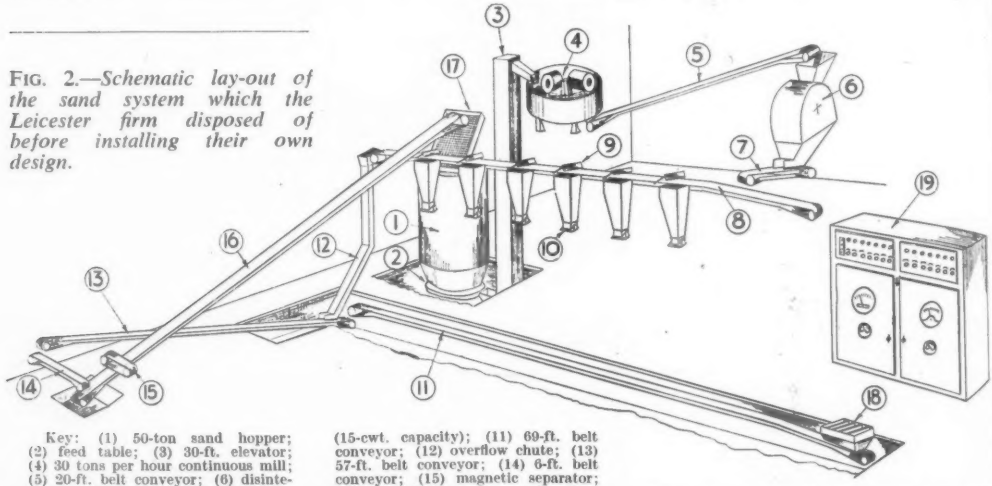


FIG. 2.—*Schematic lay-out of the sand system which the Leicester firm disposed of before installing their own design.*

Key: (1) 50-ton sand hopper; (2) feed table; (3) 30-ft. elevator; (4) 30 tons per hour continuous mill; (5) 20-ft. belt conveyor; (6) disintegrator; (7) 15-ft. belt conveyor; (8) 52-ft. belt conveyor; (9) sand ploughs; (10) hoppers over machines (15-cwt. capacity); (11) 69-ft. belt conveyor; (12) overflow chute; (13) 57-ft. belt conveyor; (14) 6-ft. belt conveyor; (15) magnetic separator; (16) 73-ft. belt conveyor; (17) vibratory screen; (18) vibratory shake-out, and (19) control panel.

General Arrangement

Following the disposal of the previous sand plant, the foundry operated without a mechanized sand system while the new plant was being built. When it was ready, only eight days (during the firm's holiday) were needed for installation. It has now been running for two years virtually without any breakdowns. The most important single item of the new set-up is an 8-ft. dia. batch-type sand mixer built by Richards to their own design. In some degree, the general features follow conventional batch-mill practice, but extreme robustness has been aimed at—Meehanite being incorporated instead of grey-iron castings, for instance.

The use of a sliding plough gets over the difficulty of deciding optimum plough spacing. The sole structural alteration required in the mechanized-foundry building to accommodate the new plant was the raising of a section of the roof above the 80-ton hopper by 12-ft. to make room for the rotary screen ($\frac{1}{2}$- and $\frac{1}{4}$-in. mesh). A "tailings" chute from this screen descends to ground level beyond the storage hopper. Delivery of sand from the storage hopper to the mill skip is by hand-controlled discharge gate and deflector chute.

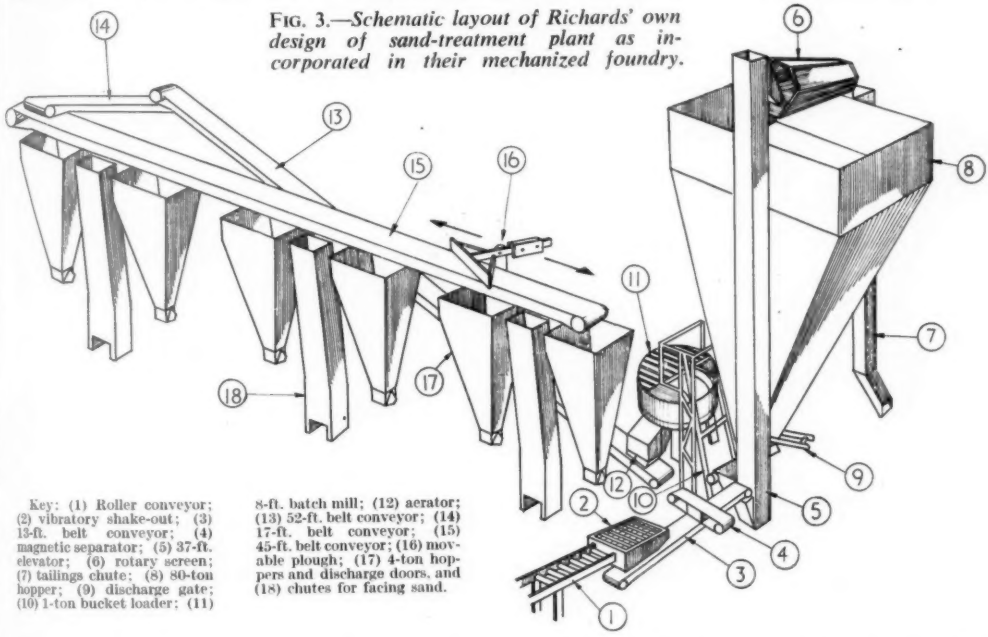
Jobbing Foundry

A second 8-ft. dia. batch-type sand mixer has

now been installed in the company's jobbing foundry (see Fig. 1). In this department, previously, sand was prepared by a number of small conventional-type batch mixers and carried by skips to the roll-over machines placed against one of the long walls of the foundry. In the new arrangement, the machines have been sited at one end of the building and a complete sand plant built to provide an adequate supply of prepared sand, stored in "shovel-out" hoppers placed behind each machine.

A Coleman-Wallwork "Floatex" shake-out has been positioned alongside the loading dock situated in the centre of one of the long walls of the foundry where castings are loaded on to a bogie and transferred direct to the fettling shop. Knock-out sand is elevated by means of a long conveyor belt (passing through an existing gantry) to an 80-ton storage hopper. This hopper is sub-divided into three compartments (for dried silica sand, ordinary backing-sand and CO_2 backing-sand), each section having its separate discharge gate placed conveniently over the bucket which loads the batch mixer.

FIG. 3.—*Schematic layout of Richards' own design of sand-treatment plant as incorporated in their mechanized foundry.*



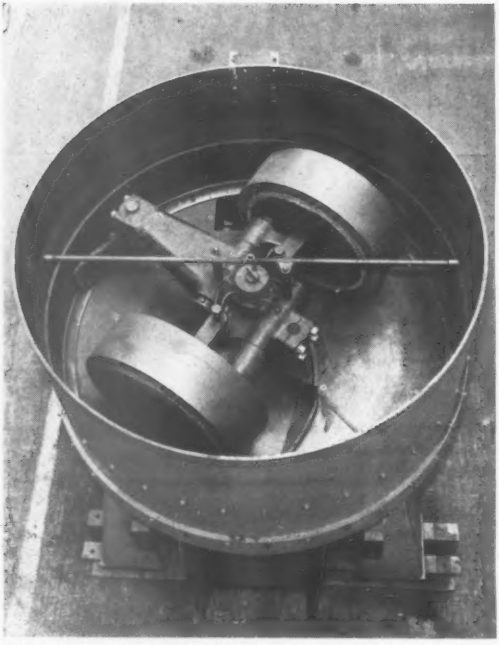
Key: (1) Roller conveyor; (2) vibratory shake-out; (3) 13-ft. belt conveyor; (4) magnetic separator; (5) 37-ft. elevator; (6) rotary screen; (7) tailings chute; (8) 80-ton hopper; (9) discharge gate; (10) 1-ton bucket loader; (11) 8-ft. batch mill; (12) aerator; (13) 52-ft. belt conveyor; (14) 17-ft. belt conveyor; (15) 45-ft. belt conveyor; (16) movable plough; (17) 4-ton hoppers and discharge doors, and (18) chutes for facing sand.

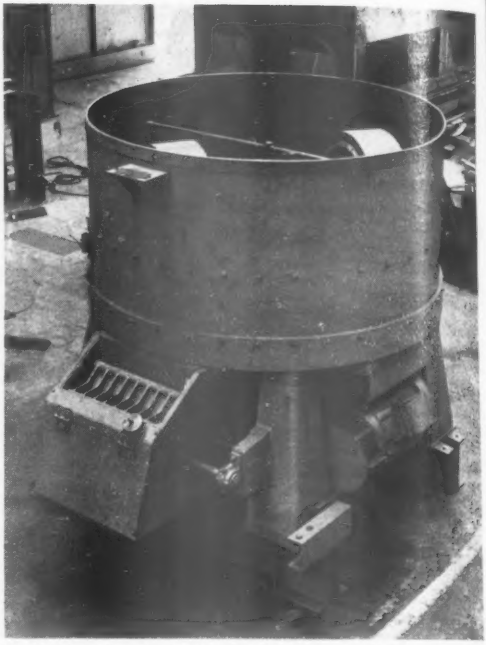
Plant Details

The 80-ton hoppers are constructed of $\frac{5}{16}$-in. steel plate; they are 30-ft. high and the elevator is 39-ft. (with the screen between). The pan of the 8-ft. dia. sand mixer (Figs. 4 and 5) is 3-ft. deep (a 6-ft. dia. mill now being constructed is 2 ft. 6 in. deep). It incorporates a high-carbon steel wear-plate on its base and also on the sides. The whole mill is independent of building foundations—*i.e.* the motor and drive are mounted under the pan and above the floor. The mullers (36-in. dia. by 11-in. face) weigh about 1-ton each and incorporate replaceable iron tyres shrunk on. Muller drive is by a central shaft, from a worm-reduction gearbox mounted directly under the baseplate of the mill, the whole being powered by a 40-h.p. totally-enclosed slip-ring motor.

The aerator (Fig. 6) built into the mixer discharge employs an independent 5-h.p. motor which—by Vee belt—drives an assembly of combing bars at high speed, forcing the sand against pressure fingers on top of the device. The bucket batch-loader for the mixer is independently or sequence operated and requires a 10 h.p. motor on the hoist. A centralized lubrication system which is arranged for the mill permits the exposure of eight grease nipples by removal of a small cover on the central muller pivot. The ploughs are Stellite tipped and last about a year before being re-built. A hinged grid-cover for the mixer works in association with a shunt limit-switch connected to the starter controlling the mixer-drive motor, and is interlocked in such a way as to prevent the mixer motor being started if the grid cover is not closed.

The rest of the sand plant—elevators, etc.—is fairly conventional except that a most beneficial device for the elevator has been the provision of bottom-shaft bearings, well spread outside the main structure. In the company's mechanized plant, the sand system is now coping with batches making a total of 90 tons daily and in the jobbing foundry 30 tons each day are treated.





FIGS. 4 AND 5.—*Overhead and side views of Richards' sand mills, the latter incorporating a disintegrator at the discharge gate.*

OTHER INNOVATIONS

Always during the inspection of a good foundry, a few details of equipment or practice stand out as being different from the general run, and the writer considers that a note of such features is one of the most valuable records which can be made for the guidance of other founders. In this respect, the Richards' foundries are no exception, and the remainder of this account is devoted to considering three quite small plant details which, nevertheless, are examples of enlightened design and robust practical execution in their application to foundry-work.

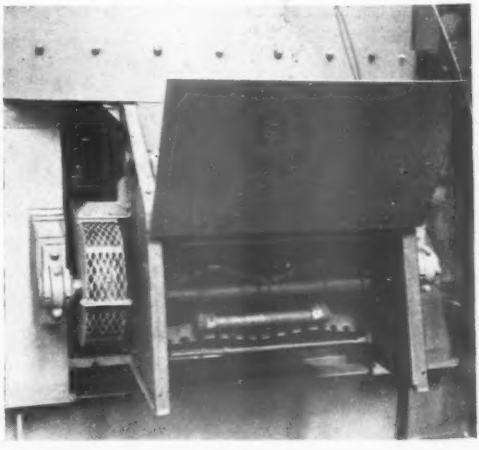
Motorized Driving Drum

The first item selected for mention in this context is the motorized driving-drum (Fig. 7) used to replace pulleys driven by external motors and gearing, particularly for belt-conveyor systems. These have been incorporated in the firm's new sand plants and in other places where a driven drum is required, and the devices are now being manufactured for outside sale under the trade name "Thorite." Sizes available at present vary from about 8-in. dia. by 15-, 20-, or 26-in. wide for up to 1 h.p. drums to 18-in. dia. by 26- or 38-in. wide for horse powers between 12½ and 15. As the illustration makes clear, the electric motor and gearing is all sealed inside the drum, the sole connection being electric leads entering through the shaft.

Conveyor Roller

In Richards' mechanized foundry, it is the practice to place all moulds on roller conveyors; these moulds then converge to a common pouring station where the moulds are poured. The roller conveyor in this pouring station is not very long, and since

FIG. 6.—*"Close-up" of the disintegrator attached at the discharge gate of the 8-ft. dia. sand mill.*



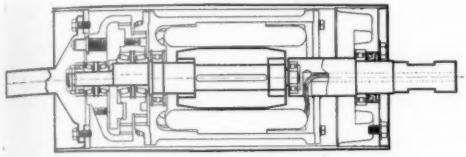


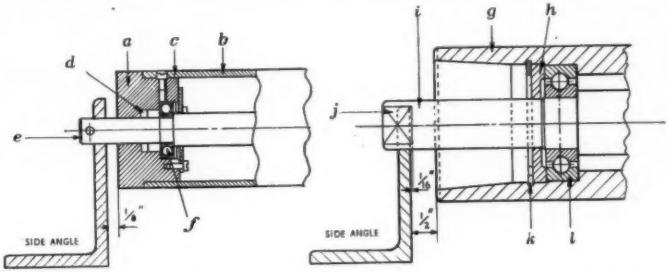
FIG. 7.—*Sectional drawing of "Thorite" motorized drum made by Richards, for driving sand-conveyor belts and the like.*

the whole of the foundry's production has to be passed through it, it will be appreciated that it has to stand up to very severe service conditions, the main cause of trouble being spilled metal which is difficult to prevent due to the speed with which moulds must be passed through the section. Originally, the pouring station was equipped with conventional steel rollers of the same pattern as used for the remainder of the foundry (see Fig. 8). However, great trouble was experienced, since spilled metal rapidly burnt through the steel roller, thus jamming it. Sometimes spilled metal, although not burning through the roller, did, in fact, freeze on to form a lump which was extremely difficult to remove. For these reasons, the pouring section gave continual trouble, since rollers were jamming quite frequently and many had to be completely replaced.

As a result, the company designed a Meehanite roller, the general arrangement of which is illustrated in Fig. 9. It will be seen from this illustration that the bearing has been withdrawn well into the interior of the roller and is very well protected from any damage due to dust or spillage. It has been found in practice that spilled metal does not in fact stick to these cast rollers, as it did to those made of steel, but generally runs off. Only a very persistent "run-out" will burn through a cast roller, and since this usually occurs at the extreme end, it does not as a rule render the roller unserviceable. However, should a roller become unserviceable, it will be noted that they are only dropped loosely into slots in the side angles of the conveyor and can be quickly removed and replaced by spares. Although the Meehanite roller is initially more expensive, it is felt it has more than paid for itself in reduced maintenance, reduction of replacements and trouble-free running in the pouring section of the foundry.

FIG. 8.—(*left*) *Part section of one end of a steel-tube ordinary conveyor roller.*

FIG. 9.—(*right*) *Part section of the heavy-duty cast roller developed by Richards for use on the pouring section.*



Key: (*a*) Meehanite housing; (*b*) 2¼-in. dia. mild-steel solid-drawn tube; (*c*) retaining washer; (*d*) felt washer; (*e*) ⅝-in. dia., bright-drawn steel shaft, and (*f*) ½ × ¼ × 1¼-in. ball-race. (*g*) 3-in. dia., Meehanite roller; (*h*) mild-steel dust ring; (*i*) 1¼-in. dia., bright-drawn steel shaft; (*j*) locking flats (also control side-play; 1/16-in. "float" allowed each end); (*k*) retaining circlip, and (*l*) 1 × ⅝ × 2¼-in. ballrace.

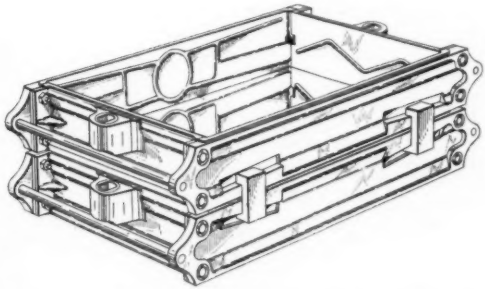


FIG. 10.—*Sketches of the moulding-box parts of patented design, incorporating Meehanite castings.*

Composite Box-part

Light-section, rolled-steel moulding boxes previously used in the company's mechanized foundry had constantly given trouble due to distortion, twisting and scaling, and this was causing castings produced in such boxes to be scrapped. Thus, the design of composite Meehanite-metal cast box-parts (Fig. 10) was developed and patented by the firm. Each part is built up of two end-wall and two side-wall castings tenoned and slotted to fit each other and machined to a tolerance of plus or minus 0.001 in. The corners are re-inforced as shown in the illustration and the tenon-and-slot joints at the corners are supplemented by bolting. The internal faces of the boxes are moulded with projecting stiffening ribs of zig-zag shape on one pair of opposing sides and on the other with straight beads radiating from a circular bead. Projections with tapers are also arranged on the sides of boxes for wedge locking one box-part with another, as illustrated. Handles for the box parts are formed by bars which pass between ear projections on opposing long sides at each end of the assembly, and lugs are cast-on to the short sides for taking box location pins and bushes. Composite boxes

made up in this way have been well tested in the foundry and stand up well to heavy duty. Even if one box-side be fractured accidently, it can be replaced quite quickly by a new side and the box returned for further service.

Conclusion

The Richards' sand plant has already proved so successful that several local founders who have seen it have requested the firm to supply similar units or separate mixers for their own works*. In this category come Ashwell & Nesbit, Limited, also of Leicester, who have prevailed upon their neighbours to supply the complete sand plant shown in Fig. 11. This is generally similar in its components to that installed in Richards' foundry, but on a somewhat smaller scale, a 6-ft. dia. mill being incorporated. The illustration well brings out the economy in space taken up by the unit. The directors of Ashwell & Nesbit report great satisfaction with the performance of the plant to date. (As this foundry itself undergoing major alterations to lay-out, further developments will be watched with great interest and probably recorded at a later date in this JOURNAL.) Orders for 6-ft. and 8-ft. mixers have been received from other foundries, including one for export to Rhodesia, which resulted from a recent visit by Mr. W. Harry Richards to that country.

Acknowledgment

In thanking the directors of Richards (Leicester), and particularly Mr. W. Harry Richards and his plant engineer, Mr. Leonard Wright, for permission to record this description of their foundry and for assistance in its compilation, the writer wishes to stress remarks made at the outset. For a founder to set about making his own plant is only justifiable in exceptional circumstances—but it is hoped that the account has proved that Richards' circumstances *were* exceptional in the nature of the almost unique facilities to hand. It is further hoped that it has been made clear with what enthusiasm they set about the job and what tangible advantages attended its completion.

FIG. 11.—*General view of a comparable sand plant installed by Richards (Leicester), Limited, at the neighbouring foundry of Ashwell & Nesbit, Limited. It incorporates a 6-ft. mill, shown in the background.*

* Since preparing this account, it has been announced that Richards are prepared to offer sand mills or design and supply complete sand plants to foundries anywhere.

Gauge and Tool Makers and Free Trade

Apprehension as to the possible effect of the Free Trade Area on the gauge and tool making industry was expressed in London last week by Mr. F. W. Halliwell, president of the Gauge and Tool Makers' Association. While they did not fear competition, he pointed out that their competitors abroad enjoyed certain advantages. Mr. Halliwell, who was presiding at the association's trade luncheon, welcomed the Government's anti-inflation measures.

Sir David Eccles, President of the Board of Trade, emphasized that the battle against inflation was a national one. Referring to the Free Trade Area proposals, Sir David said these were in line with the whole trend of the present age. One main reason for adhering to the scheme was the necessity for expanding exports to Europe.

ACAFE Study Tour

The Joint Iron Council point out that although it was not mentioned in the report appearing under the above heading last week (on page 621), they were consulted during the organization of the Asian experts' study tour in the country, and in fact arranged their visit to Tame Bridge Foundry.

UK Nuclear Power Plant for Italy

By June 30 next year, a formal contract between the Italian A.G.I.P. Nucleare and the British Nuclear Power Plant Company, Limited, will be signed for the construction of an atomic power station in Italy. The agreement, the first of its kind in the world, will give Italy the first commercial nuclear power plant on the Continent. The plant will have an electricity generating output of 200 mw. The total amount involved is understood to be about £26,000,000, about one third of which will be spent in Britain.

Equipment & Supplies

Pre-coated Resin Sands

In order to meet the increasing demand for pre-coated resin sand for the manufacture of shell moulds and cores, Fordath Engineering Company, Limited, Hamblet Works, West Bromwich, have embarked on three enterprises:— The provision of new coating resins, the supply of coated sand (which has been designated "Plastsand") and the furnishing of plant to foundries for the making of pre-coated sand.

Manufacture of Resins

At the moment, there is being erected at West Bromwich, a plant for the making of phenol-formaldehyde resins. Whereas most of the resins being marketed to-day for shell work are sold as fine powders, or alcohol solutions of these powders, Fordath engineers believe that a liquid medium is much to be preferred to powders, which have to be re-liquefied during the mixing with sand. Thus, the firm has acquired a licence from the Acme Resin Corporation of the USA for the use of its Patents for the manufacture and sale of specialized liquid phenolic resins, and for the process of coating sands with these resins to produce "Plastsand" for the British and European markets. The writer confesses he is not familiar with this branch of industry but seeing large size reaction vessels of stainless steel, realized that such plant is costly. The advantages claimed for these liquid resins is their high strength in relation to percentage employed, giving a firm coating, which will not flake off the pre-coated sand-grains when blowing or handling, and freedom from lumps during storage in sack or hopper.

Resin-coated Sand

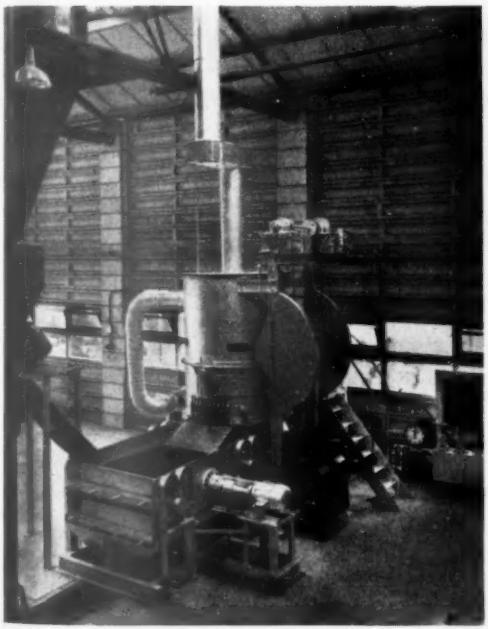
As shell-moulding and coremaking are essentially mass-production jobs, the availability of a standardized moulding medium is obviously a great asset, as it eliminates a critical variable. Another variable which is controllable is the melting point of the resin to suit various types of production. For instance, 105 deg. C. is suggested for deep-draw patterns, whilst 80 deg. C. will serve for blowing cores. A second advantage, and this on the economic side, is the materially lower resin content required in the mix.

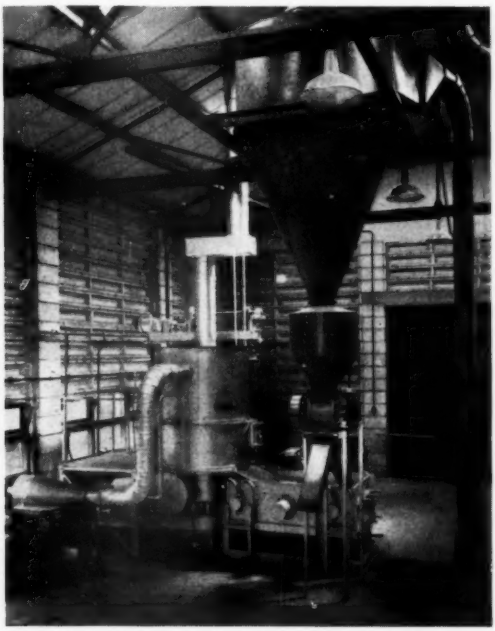
Equipment for Coating

The plant in operation at the West Bromwich works for the making of pre-coated sand would be of too great a capacity for any but the very largest foundry concerns. It uses a No. 2 size Fordath mixer and is at present turning out about 5 cwt. every 15 min. The plant is splendidly instrumented and automatic in operation. The panel, shown on the lower right-hand side of Fig. 1, carries six clocks, which enables a set time to be imposed for each operation. Thus, the mulling times before and after the addition of water—after experimenting over a range—can be standardized at the optimum figure. Later plants will see this panel extended to carry instruments for controlling temperature of air, the starters for the motors and similar equipment.

The mixer itself has been modified, as there is a hot-air inlet to the mixing chamber through louvres disposed around the centre hub of the mixer arms. The whole

FIGS. 1 AND 2.—*Two views of the machine developed by Fordath Engineering Company, Limited, for preparing resin-coated sand. In Fig.* 1, *the timing mechanism can be seen (r.h.s.) and in Fig.* 2 *the air-heater is shown on the left.*





Equipment and Supplies

mixer is totally enclosed and the charging and inspection doors and the flange aperture for introducing resin and water are dust tight. The machine is bucket loaded, whilst the other raw materials are introduced automatically; the discharge door is operated by compressed air.

The air is heated by gas to a controlled temperature (over 200 deg. C.) in the apparatus shown at the bottom left of Fig. 2. Blown by a fan at the rate of 1,000 cub. ft. per min. at 3-in. w.g., the air is carried by insulated ducting to enter the mixer centrally, where it passes through the sand/resin mixture during its preparation.

When the coated sand is discharged from the mixer, it falls on to a double-decker vibrating screen, measuring 3 ft. 6 in. by 5 ft. The top deck carries a ½-in. wire mesh and the lower $\frac{1}{16}$-in. mesh. From the pit, the coated sand is sucked up by a Keith Blackman fan and its velocity is dissipated in a cyclone; it falls through an intermediate storage hopper at the lower end of which is a two-way delivery chute and motorized rotary discharger. Finally, stout asphalt-lined paper bags, resting on a weighing machine—not shown in the illustrations—are automatically filled. The total horsepower installed for the functioning of this plant is of the order of 57. For the average size of foundry, a much smaller plant is available, which obviously has no bag-filling apparatus, and which is designed to handle 2-cwt. batch loads.

Electrolytic Polishing

The continuous rotation of the electrolyte in an electrolpolisher, made by the Shandon Scientific Company, Limited, 6, Cromwell Place, London, S.W.7, prepares specimens for immediate microscopic examination. Drawn through the centrifugal pump the electrolyte is pumped through a series of holes so that it contacts the specimen as a constantly rotating, continuously renewed liquid column. This ensures a polish and finish without flow lines. It eliminates cold working and false deformation structures and reduces the time spent on specimen preparation.

The polishing deck, mounted on rigid PVC, is a self-contained unit resting on the electrolyte tank and contains the pump, specimen clamp and electrolytic cell.

The power supply has separate D.C. outputs and controls for manual and automatic polishing and etching. Additional output terminals provide facilities for beaker etching when required.

On "manual," all switches are independently and separately controlled by on/off switches. For operation on "automatic," the time switch is set to the required polishing period (within a range of 1 to 90 sec.). At the end of the period both the pump and the D.C. are automatically switched off. Electrolytic etching can be caried out as part of the operation by switching to "etch" during the last seconds of the cycle. The pump is made from PVC and polythene, and all components in contact with the electrolyte are made from corrosion-resistant material.

Mechanical Shovel

A new pedestrian-controlled mechanical handling device which will be of interest to foundrymen has been announced by F. E. Weatherill Limited, of Welwyn Garden City. It could be of great practical use in cases where, because of space limitations, a bulk handling job must still be undertaken by hand shovel and manual labour. The "Microloda" as it is called is capable, it is claimed, of doing the work of four men with wheelbarrows and, being self-propelled, individual loads of up to 3½ cwt. can be transported without physical effort to the desired point. A feature of the device is its manoeuvrability and the smoothness of operation achieved by the fluid flywheel transmission.

This useful and intriguing little machine was one of the highlights of the representative display of mobile loading shovels shown by F. E. Weatherill Limited, who are specialist manufacturers of this type of equipment, at the Building Exhibition recently held at Olympia.

Degassing Compound

Foundry Services, Limited, Long Acre, Nechells, Birmingham, 7, have developed, in tablet form, a new material for degassing aluminium, marketed as "Degaser 400." The new tablet has a central hole through which a plunger rod may be inserted, for ensuring that the tablet reaches the bottom of the bath of metal. Two sizes are available, suitable for 50 and 100 lb. melts. Tests effected indicate that the hydrogen content, after degassing, is reduced from 0.20 ml. to 0.09 ml. per 100 gm. while the specific gravity is raised.

Welding Helmet

Panorama Equipment, Limited, 29/36, Seymour Mews, Wigmore Street, London, W.1, have recently introduced a new design of welding helmet. This will incorporate the following practical improvements: (1) a flip-front glass holder, which allows quick observation of work without raising the helmet; (2) a rachet-type adjustable cushion headband, allowing instant fitting to all head sizes; (3) free-floating headgear for improved back balance, and (4) a three-position adjustable chin rest.

"Nimbus" Dumper

Thwaites Agricultural Engineering Company, Limited, Welsh Road Works, Cubbington, Leamington Spa, announce an addition to their range of small diesel dumpers to be known as the "Nimbus". It has a skip of 16 cub. ft. capacity; a two-speed and reverse gearbox; a low loading height of 36 in. and great manoeuvrability is claimed owing to the small turning radius of under 7 ft. 9 in. Its carrying capacity is 15 cwt. and a Petter 5-6 h.p. diesel engine (removable from the chassis in 15 min.) provides the power unit.

Fork Truck

An electric fork truck of 3½ tons capacity which can make right-angle turns in less than 13 ft. has just been introduced to British industry by the Yale & Towne Manufacturing Company, Wednesfield, Wolverhampton, Staffordshire. The truck, which has been designed for continuous duty, has a wheelbase of only 56 in. The rear wheels turn through 80 deg., and permit the truck to operate in equal aisles of 78 in.

Bench Assembly Trays

Bench assembly and storage trays recently introduced by Precision Components (Barnet) Limited give particular ease in handling as they interlock with the insertion of rivets, nest when empty and can be used in a straight line, a semi-circle or a combination of both. They are moulded in resin-impregnated compressed fibre.

A NEW REFRACTORY CONCRETE claimed to have a working temperature of 1,800 deg. C. has been placed on the market by Purimachos, Limited, Bristol 2. Called Conkos No. 1, it is described as a super-duty castable pre-mixed material. High chemical purity and an alumina content of 96 per cent. are also stressed.

American Engineers discuss Foundry Subjects

Report of ASME Fall Meeting

At the Fall Meeting of the American Society of Mechanical Engineers, held at Hartford, Connecticut, on September 22-25 this year, a wealth of technical material was presented, in the form of some 60 papers, on a range of subjects which included gas-turbine power and metals engineering. Sessions devoted to the latter comprised a quantity of material which will be of direct interest to founders, and under the former section papers on turbine castings were read. In what follows abstracts are given of the contributions of major importance to founders from the technical sessions.

Virtues of Chill-cast Surfaces for Various Applications

By David C. Ekey and Erroll V. Black

Mr. Black, who presented the paper, is associated with the Lebanon Steel Foundry. He reported exceptionally useful results for television-tube moulds made of stainless steel with the working surfaces chill-cast. The steel was of a 410-type containing approximately carbon 0.10 and chromium 12½ per cent. The fine-grain surface was retained after heat-treatment. The author enumerated several additional examples in which the chilled surface feature became a useful factor. A discussion defined the fact that the practice applied to limited surface areas and that the die-casting of large volumes of metal, such as a 10-in. valve body, would be outside its scope. It also became clear that the depth of chill would penetrate the surface for about half of the thickness of the chill that was used. The mechanical properties were not appreciably different in the chilled surface and the use of a copper chill instead of a steel one provided no improvement. Some shops used small chills to core away metal volume and make lighter castings. Chills were usually coated with a silica wash and both the stainless steels and the low-alloyed steels developed similar advantages over the chill-cast surfaces. The point, that a columnar grain on a hammer or die surface might offer greater wear-resistance than a random grain pattern, was elucidated by further discussion. Chills usually employed varied from 1- to 3-in. thickness. The surface improvement was frequently confirmed by the sulphur-print test which showed that sulphur-enriched areas were pushed inwardly from the chilled surface. Attention was called to chill-cast steel-roll production. in the course of which process a ¼- to ½- to 1-in. thickness of sand on the chill-face might be employed to intensify surface cooling of the casting and produce finer-grained structures.

Use of Non-destructive Testing on Steel Castings for Elevated-temperature Service

By Clyde B. Jenni

The author, who is chief metallurgist of General Steel Castings Corporation, pointed out that in 1905 maximum temperatures in power-plant service were approximately 260 deg. C. and that over the intervening 50 years the temperature limit had increased about 12 deg. C. per year so that it was now at 593 deg. C. Pressures had correspondingly increased up to 1.0 ton per sq. in. and 2-2.25 ton pressures were in sight. The steel castings involved were turbines, valves, steam chests, nozzles, etc. The metallurgy had been moving toward creep-resisting steels made very cleanly and with low-phosphorus and sulphur contents plus ingredients to resist graphitization.

Foundry practice had been directed toward improving quality and integrity and the incidence of shrinkage, hot-tearing, sand, gas or slag inclinations had been progressively reduced. Hot-tearing had been avoided by balancing changes in section and reducing stress-concentrations and "hot spots" and by the practice of feeding heavy sections through a light section. Non-destructive testing had included: (*a*) visual inspection, (*b*) radiographic inspection sensitive to 2 per cent. of the metal thickness, (*c*) magnetic-particle inspection for surface cracks and discontinuities and (*d*) ultrasonic inspection. In addition, cobalt 60 had supplemented radiographic inspection enabling penetration of sections 6 to 8 in. thick. X-ray inspection employed 250 kva. for sections up to 2-in. thick, he said, and then moved to 1 million volts for 6-in. and 2 million volts for 8-in. thicknesses; Betatrons at 15 million volts and 22 million volts could penetrate sections 16-in. thick. At the present time a recommended practice in ASTM ≠ 71-52 was employed as a reference pattern.

Castings, the author said, were unacceptable (1) if they contained cracks, hot tears, fused chaplets, and so on, (2) if a weld area was bad because of its location, (3) if discontinuities occurred near valve seats, bores or cored holes, (4) if gas holes, pits or spongy areas attained a depth exceeding 10 per cent. of the thickness, (5) if centreline shrinkage was detectable in an undesirable area (*i.e.* if the shrinkage occured in the middle ⅓ of the section, it might be acceptable. In all cases, it was related to the wall thickness. (6) Defects located near the neutral axis or low stress-points inside the casting and not at the surface could be rated harmless.

Radiography was employed (1) if a repaired or defective area had been penetrated all the way through the wall, (2) if, in the weld-repaired area, any evidence of damage remained. In the same area magnetic particle inspection was also applied; acceptance after these inspections was based upon ASTM Specification E99-55T.

* It is understood that copies of the full text of most of the papers are obtainable from American Society of Mechanical Engineers, Order Department, 29 West 39th Street, New York 18, NY.

ASME discuss Foundry Subjects

The topic was further elaborated by reference to the fact that inclusions of sand or slag with a length exceeding ¼ of the thickness of the casting were unacceptable. In no case should they be longer than ¾-in. Cracks were unacceptable in any case and had to be removed and repaired. Stereographic perception of radiography could be applied to establish the depth and location of defects in a casting and a similar procedure was to move the light source and to measure the images, thus calculating the location. Ultrasonic inspection required care in the preparation of surfaces and attention to the geometry of the casting.

Correlation of Elevated-temperature Data on Steel Castings

By James W. Freeman

The author, a professor at the University of Michigan, reported that differences in elevated-temperature properties between castings and wrought material of the same composition and quality were indistinguishable and that fine details of chemical composition and heat-treatment often governed final results. The heat-treatment in many cases masked the differences between wrought and cast materials of like composition which had been annealed, normalized or quenched and then tempered at unlike temperatures. Even when these factors were bracketed within a "controlled specification" there was a heat-to-heat variation due to the influence of minor elements, such as de-oxidants. There was a corresponding difference in properties due to the level of the homogenizing heat-treating temperature at which carbides dissolve at progressively higher solution temperatures. These details produced a scatter band with a variation of 50 to 200 per cent. between similar specification materials.

The ASME attempted to apply elevated-temperature data to material made commercially as opposed to that which had been laboratory-processed. In laboratory work for a specific elevated temperature, the creep strength might vary from 3.2 to 12.9 tons per sq. in. The corresponding load carrying ability at a specific temperature would vary from 200 to 300 per cent.

Creep diagrams frequently showed an overlapping of creep loads so that some judgment in the selection of materials needed to be exercised. For example, a 1¼ per cent. chrome, ½ per cent. molybdenum cast steel might be stronger in the range of 482 deg. to 537 deg. C. than its more richly alloyed companions.

Further discussion brought out the practice of the ASME pressure vessel code body of applying a discount to castings in comparison to wrought metal. This embraced a "quality factor" and a "shape factor." The composition of the cast metal could be satisfactory but uncertainty about its soundness brought about the precaution of applying a quality factor. There were comparatively few failures in castings caused by an excessively-high stress design.

Evaluation of Ductile Iron as an Engineering Material

By Arthur Avedisian

The author submitted a description of spheroidal-graphite iron and a comparison contrasting the pearlitic structure of cast steel with that of s.-g. iron. He analysed and commented upon the relationship between mechanical properties and structural components, and described graphite nodules as stress diffusers wherever stress concentrations occurred, indicating that s.-g. iron behaved elastically and possessed a definite stress/strain relationship which established its modulus of elasticity. The s.-g. iron was offered in two common types, namely, the 80-60-03 grade and the 60-45-10 grade, the latter, or weaker, grade comparing favourably with plain carbon-cast steels.

Some mention was made of the weldability within limits of the s.-g. iron and the improved wearing quality over steel which the graphite pellets provided. Its resistance to shock was good so that it was acceptable for use in the construction of accessories for ships and its machinability was comparable to that of steel. It could moreover be cast into much thinner sections. Its production required more care than grey iron and the economy of its application depended upon the shop practice, type of work and local conditions. In conclusion the author gave a list of the uses and properties of the material.

A discussion arose in connection with the broad 10 to 24 per cent. range of elongation mentioned for the material and the reply indicated that some grades were brought within an 18-24 per cent. elongation specification while others allowed 15-24 per cent. The implication was that either a higher minimum elongation or a narrower allowable range should be specified to define the product adequately.

Weldability was discussed and the point was made that specific grades needed to be defined to accommodate welding. The cost of the material in comparison with that of grey iron was discussed and an estimate that costs could range from 30 to 50 per cent. greater was mentioned. The importance was emphasized of fatigue and impact properties, these being essential in the application of tougher forms of graphite cast iron in which s.-g. iron was included.

Mechanical Properties of Grey Cast Iron

By Thomas E. Eagan

The author, attached to the Cooper-Bessemer Corporation, reported upon grey cast iron mentioning that its production was ten times that of cast steel and 13 times that of malleable iron. Its dominant features were its castability, cost and broad range of mechanical properties, and its low cost was associated with foundry advantages, as, for example, the fact that it enabled castings to be made without feeders.

The specifications in use in the US and details of the test-bar requirements were enumerated. The tensile-strength ranges of 8.9-26.8 tons per sq. in. in which grey irons can be specified were outlined.

Diagrams were presented to illustrate the effect of sections up to 4-in. thick in producing strengths higher than specification for thinner sections and somewhat lower strengths than specification for thick sections.

Formulae for estimating the tensile strength from the composition and volume-area factors were described. The risk of employing a Brinell hardness index for tensile values was mentioned and its use as a controlling factor was to be discouraged. Compressive strength was good and usually five times the tensile strength for a No 20 iron and three times the tensile strength for a No. 60 grade. The modulus of elasticity had limitations and an effective modulus was devised by employing loading up to 25 per cent. of the tensile strength. In general, the elastic modulus increased as the tensile strength increased. The shear strength would range between 1.2 and 1.6 times the tensile strength. The fatigue strength would range from 0.33 to 0.57 per cent. of the tensile strength depending upon the mass of the section and the location of test specimens used to measure it.

In the case of notched specimens in fatigue tests, the sensitivity increased as the strength increased. A ratio of smooth to notched-bar tests might fall in the bracket of 1:1 for a No. 20 cast iron and decrease in the ratio of 1:1.25 for a No. 60 cast iron. For example, a 10.7 tons per sq. in. fatigue strength for a smooth bar would decrease to 8.5 tons per sq. in. for a notched bar in the No. 60 grade.

Machinability was related to the hardness and tensile strength. Resistance to wear, as in the case of engine pistons and cylinders, was in general superior to other ferrous castings particularly if the correct microstructure for the graphite was achieved. The heat-resistance was better dealt with through recent developments in specifications under which irons of the No. 20 to 40 class were eligible for use in pressure vessels up to a 232 deg. C. maximum temperature while higher strength types Nos. 40 to 60 were eligible for a 343 deg. C. maximum temperature. ASTM Specification A278 defines the basis requirements.

From discussion emerged questions concerning heat-treatment and specifically stress-relief annealing. This was dealt with by pointing out that a 2 hour heating at 593 deg. C. for a small casting was better than 15 hours heating at 537 deg. C. and both treatments were far superior to days or months of ageing in the storage yard. The "Cast Metals Handbook" of the American Foundrymen's Society was mentioned as a reference source for detailed information of this type.

Cast Nine-per-cent. Nickel High-strength Steel for Low-temperature Service*

By I. B. Elman and L. M. Diran

The authors, both of whom are attached to International Nickel Company, pointed out that equipment for processing and storing gases and liquids at low temperatures and high pressure required materials which had high strength and were capable of retaining high ductility at temperatures as low as −320 deg. F. and indicated that these requirements were fulfilled by 9 per cent. nickel steel. In the wrought form this may be heat-treated to develop yield and tensile-strength values exceeding 44.6 and 52.5 tons per sq. in. respectively and impact values greater than 15* ft./lb. at −320 deg. F. Cast, it developed 46.0-49.6 tons per sq. in. tensile strength, 34.8-42.5 tons per sq. in. yield strength, 20-27 per cent. elongation, 42-45 per cent. reduction of area and 200-230 BHN. Many new design applications suggested the use of this material in the form of castings.

Nine heats of 9 per cent. steel had been cast to determine the effects of carbon, small additions of molybdenum and variations in deoxidation practice upon the impact properties at temperatures ranging from +70 deg. to −320 deg. F. The steels had been given the following heat-treatment: 898 deg. C. —4 hours—Air cool; 787 deg. C.—4 hours—Air cool; 565 deg. C.—10 hours—Air cool; 510 deg. C. —10 hours—Air cool.

The effect of deoxidation practice showed the silicon-manganese deoxidation was the most effective for superior impact-values. A series of heats containing 0.04, 0.14 and 0.24 per cent. carbon indicated that the optimum impact resistance was obtained with about 0.14 per cent. carbon. Maximum impact resistance was realized on adding approximately 0.29 per cent. molybdenum. The thermal expansion was constant between −200 deg. and +70 deg. F. and the instantaneous and average thermal expansion coefficient would be the same over this temperature range.

Inco-Rod "A", a high-nickel-alloy electrode for welding dissimilar metals, had, the author said, been found suitable for welding wrought 9 per cent. nickel steel, and experiments at the International Nickel Company, Incorporated Research Laboratory, and at Adirondack Foundries and Steel Incorporated, indicated that the rod was also suitable for welding 9 per cent. nickel.

Investigation had shown that a cast 9 per cent. nickel steel containing 0.14 carbon, 0.29 molybdenum and deoxidized with silicon and manganese possessed a 15-ft./lb. transition temperature at approximately −330 deg. F.; that optimum impact values were realized with the silicon-manganese killed steels; optimum carbon content was about 0.15 per cent.; optimum results with molybdenum were realized with about 0.30 molybdenum; and finally that cast 9 per cent. nickel steel retained constant coefficients of thermal expansion from temperatures ranging from −200 to 70 deg. F.

Functional Analysis to Final Design of a Steel Casting

By Robert J. Franck

The author (Superior Steel and Malleable Castings Company) pointed out that the function of the casting dictated the shape, that the shape controlled the castability and that afterwards the foundry and

* Charpy keyhole notch, ASTM Specification A352-55T.

ASME discuss Foundry Subjects

machine shops applied their practices to produce the desired structure.

Illustrations of shapes which were castable and shapes which were functional followed, and it was emphasized that castings possesed freedom of shape and thus, the customary straight lines which draughtsmen were inclined to use, could frequently be modified into desirable curves, a practice which might save 25 to 40 per cent. of the weight of a structure.

Design Characteristics of Magnet-steel Castings

By William C. Pierce

The author dealt with specifications for dynamo steel commonly used in his practice for providing a high induction and low coercive force electrical properties. The specification employed and its actual fulfilment were outlined and it was pointed out that trends toward carbon contents as low as 0.02 to 0.03 were being developed. At the present time, he said, specifications were agreed upon and there were no national standards. Electrical engineers had not evaluated their requirements extensively in the case of cast steels. Residual elements, such as copper, chromium, nickel, etc., were not considered critical if present in relatively small amounts and in some cases nickel, for example, was desirable. Discussion brought out the fact that similar products were specified with residual limits of chromium 0.04, manganese 0.04, molybdenum 0.04, nickel nil, silicon 0.30 per cent., and as low a carbon as possible. Further discussion left unsettled the question as to whether a high purity in terms of very low carbon and very low sulphur limits could be balanced by admitting sufficient manganese or silicon to provide for a greater solidity and soundness in cast shapes.

Furthur extracts from ASME papers of foundry interest will be printed shortly

International Trade Competition

Four apprentices of Metropolitan-Vickers Electrical Company, Limited, were among those who represented Britain in an international trade competition which was held recently in Madrid. They were chosen from eight candidates nominated by the company at the request of the City and Guilds of London Institute, and in their respective trades were awarded one second and two third prizes. Certificates were presented to them by Mr. Frederick D. Hill, secretary of the British organizing committee.

The international trade competition, which was started in 1950 under the auspices of the National Headquarters of the Spanish Youth Organization, and the Portuguese Juvenile Organization *Mocidade Portuguesa*, is run by an organizing committee consisting of representatives from each of the competing countries, which this year were Belgium, Britain, Eire, France, Germany. Holland, Italy, Morocco, Portugal, Spain and Switzerland. Since 1950 the competition has been held in Spain, but it is likely that in the future it will be held in a different country each year.

News from South Africa

The third two-way trade campaign sponsored by the Federation of British Industries and the Board of Trade, was featured in Johannesburg from September 14 to 28. The two previous campaigns were held in Cape Town and Durban. There were a great many exhibitions, some of which were organized in co-operation with certain stores, whilst others were individual efforts on the part of manufacturers. The exhibitions depicted British craftsmanship and also goods made in South Africa from British materials and goods exported from South Africa to the United Kingdom. The British motor industry was represented by about 300 vehicles of different types and makes.

In an interview, Mr. John Parker, the organizer appointed by the Federation of British Industries, said that the United Kingdom was most anxious to foster trade with South Africa as she had always taken part in the economy of the country, having invested more in South Africa than in any other Commonwealth country. He went on to say "During the past ten years £750,000,000 has been invested in the Union, and of this sum the United Kingdom invested £500,000,000. While we are pleased to see a steady increase in exports from South Africa to the United Kingdom each year, we would like to see exports from the United Kingdom to South Africa increase proportionally. We feel certain that with the promised relaxation of import control we should be able to offer to South Africa merchandise which has not previously been seen on this market and which is at present being exported to other parts of the world."

Simple "Inconel" Cutting Method at Jan Smuts

The welding department of Jan Smuts Airport's engineering division have developed a simple, cheap and effective method of cutting the tough metal "Inconel" in confined spaces. The tool consists of a 4-in. dia. mild-steel disc mounted on an air, or preferably electric, grinder revolving at 20,000 r.p.m. This speed causes the periphery of the disc to become red-hot, and gives a most effective friction-cutting action.

Fatal Accident

Last month the body of a native who had crept into an oven to sleep at a Pretoria West Foundry and had been overcome by heat and carbon-monoxide fumes when the fire was lit beneath him, was found by foundry workers when the oven door was opened to start the week's work. The native, John, had worked at the foundry for a year. He is believed to have climbed into the oven while the watchman was away for 15 minutes. Late in the afternoon the fire was stoked up. No cry or sound of a struggle was heard from inside as the temperature rose. From the position in which the body was found, it is concluded that John was asleep when the fire was lit and was gassed without waking up.

Engineering

Light as well as heavy engineering concerns in the Union are reported to have had a busy month during June, says "Barclays Trade Review," although a slight falling-off has been noticeable here and there in the case of light repair work. Reports from Port Elizabeth speak of a marked shortage of well-trained artisans in that centre.

Marine engineers are busy clearing up the backlog of ship repairs caused by pressure from the last of the shipping diverted from the Suez route. In this respect, the movement of vessels is now more or less back to normal, and engineering concerns will doubtless soon revert to more normal working conditions.

World Metal Congress

"*Foundry*" *Discussions in Chicago*

Midweek meetings of delegates to the World Metal Congress at Chicago during the period November 3 to 7 included a session on the continuous casting of metals. The discussion* involved steel mainly, and reviewed the copper, brass, aluminium and European practices quite briefly.

Practical Aspects of Degassing

At the Congress session on practical methods of metal degassing, the chair was taken by Mr. A. J. Phillips (American Smelting & Refining Company) and the panel included Dr. E. Scheuer (International Alloys, Limited). Here, a discussion of degassing methods for non-ferrous metals indicated that most of the problems were concerned with aluminium and magnesium alloys. A discussion of copper degassing indicated that the presence of oxygen or hydrogen could be readily avoided by well-established procedures. Of these two, the hydrogen elimination problem was the more serious, but the elimination of this gas could follow readily if oxygen or oxidizing additions were applied. Application of additional oxidation would follow provided the SO_2 content did not exceed 0.002 per cent. With higher sulphurs, however, it appears that the oxidation cannot be controlled. The usual procedure consists of removing the sulphur, then removing the hydrogen and then applying the desired degree of oxidation. These ends are best accomplished through the use of low-sulphur melting fuels and ample furnace ventilation.

Gases in brass of high-zinc content were reported to be a rare occurrence and their elimination commonly accomplished by heating the metal up to flaring temperatures, when the resulting turbulence eliminated the gas. In the foundry, brasses of very low zinc-content might require oxidation treatment and both tin bronzes and low zinc alloys, oxidation methods followed by deoxidizing practices were said to achieve best results. Some discussion followed concerning the degassing of aluminium for pressure-die-casting applications.

Typical fluidity test-patterns were employed to track the improvement which chlorine treatment of the metal produced. It was reported that improvements in fluidity of the order of 15 to 20 per cent. could be expected for a 4½-cwt. ladle of metal. Tests with shell moulds or in metal dies produced parallel results and required a super-heat of approximately 55 to 95 deg. C. In the treatment of metal charges which consisted entirely of scrap, the chlorine gassing treatment could improve the "castability" by as much as 50 per cent.

Aluminium

The degassing of aluminium for ordinary castings was discussed from the standpoint of the desirable temperature at which to carry out the operation. One of the panel members recommended working in the range of 700 to 715 deg. C. Someone posed the question of whether to allow aluminium to cool and then reheat it to eliminate gas and the reply indicated a preference for degassing at a higher temperature and pouring immediately. Considerable emphasis was placed upon the need to keep a film on the liquid aluminium to avoid contact with moisture or air. The importance of the film was emphasized by pointing to the possibility of pouring water on the film without encountering gas absorption difficulties whereas a break in the film produced an extremely rapid gas absorption. The need to pour moulds from a point close to the sprue cups to reduce the hazard of film breakage and contact with the atmosphere was emphasized. Some additional discussion on pressure-die casting involved the build-up of gas in metal caused by the dipping of ladles into melting pots. This practice was so difficult to analyse that the solution to the gassing problem became an individual one in each case and had to be separately judged. In other respects the degassing practices followed the established procedures of fluxing, degassing and pouring.

Oxygen in Cast Iron

In the absence of the author, Mr. Gustaf Ostberg, of Sweden, a paper on oxygen in cast iron was read to the meeting, and the accompanying abstract is a record of the author's summary: The oxygen solubility in cast iron has been estimated from existing information in the literature concerning equilibria between oxygen, carbon, and silicon in iron alloys. The oxygen contents computed range from 5 to 30 parts per million depending upon alloy composition and temperature. Sampling methods and analysing technique have been investigated. With application of these findings, the oxygen content in cast iron of the malleable-iron type was studied on spoon samples analysed by vacuum fusion. When compared with the calculated solubility at equilibrium, the oxygen content in practice in most cases was found to follow the theoretical trends. Kinetic factors influencing this behaviour are discussed as well as the occurrence of oxygen-bearing inclusions as observed in the microscope.

It was indicated that malleable cast irons of the 2 to 3 per cent. carbon, 1 to 2 per cent. silicon type had been under observation, and that 30 to 75 parts per million of oxygen could be present in cupola-melted metal. In an air furnace melt, the quantity would usually fall in the range of 10 to 13 parts per million. Some of the oxygen decrease in the case of duplex melting was a reflection of the decrease in silicates as the product moved from cupola to air furnace. Over long-term observations (for one or two hours), the oxygen content would progressively decrease to 9 parts per million in 45

* Much of the reference material for this discussion has already been published in the August and September, 1957, issues of the AIME *Journal of Metals*.

World Metal Congress

minutes and to as little as 5 parts per million in two hours.

Closing Sessions

The World Metal Congress closed with a farewell dinner to overseas visitors at the Palmer House in Chicago, on Friday, November 8. During the week, in addition to the programme of technical papers, several discussions on metallurgical topics were held which included: (1) general heat-treatment, (2) welding, (3) steel gears, (4) steel "formability," (5) heat-treatment after welding, (6) continuous casting, non-ferrous metals, (7) machining of steel, (8) steelmaking and steel refining, (9) non-ferrous metals, (10) research and education, and (11) inspection and testing. Out of this programme, however, only the discussions dealing with steelmaking, continuous casting of non-ferrous metals, degassing and the welding sessions contained elements of major interest for foundrymen. It is expected that the full technical papers of the Congress will gradually emerge through the sponsoring organizations.

It is interesting to observe that of some 500 delegates, approximately 90 came from India, 80 from Great Britain, 70 from Germany and 70 from Japan with the remainder consisting of a scattering in numbers down to as few as one or two delegates from a total of 40 countries.

Machine-tool Design

Research on the mechanical design of machine tools is being undertaken in the Department of Mechanical Engineering at the Manchester College of Science and Technology. The mechanical design of a machine tool limits the accuracy and speed of operation obtainable when automatic controls are applied. The Department of Mechanical Engineering is well equipped to undertake practical research in this field, and to help in the direction of the work a number of leaders in the machine tool, electronic, and aircraft industries have been invited to serve on an advisory panel.

The National Research Development Corporation, which is at present bearing the entire cost of the project, proposes to make the results of this work available in the form of test reports and design data to all interested firms in those branches of British industry concerned with the design or use of machine tools. The corporation will also negotiate licences for the use of any inventions arising from the work at Manchester. A number of steps have been taken, chiefly through the trades associations, to ensure that results become widely known with the minimum of delay.

THE SECOND ANNUAL DINNER/DANCE of East Sussex Engineering Company, Limited, was held at Lewes Town Hall on November 16, and was attended by 140 members of the staff and their friends. The chairman, Mr. A. Ethell, and managing director, Mr. E. E. Burchell, of the H. & C. Davis Group of Companies, of which East Sussex Engineering Company, Limited, is a member, were at the manager's table.

Notes from the Branches

Burnley

On Saturday November 2, the Burnley section of the Lancashire branch of the IBF held their annual whist drive, dinner and dance at the Odeon cinema, Accrington. Amongst the guests were the national president and secretary, Mr. J. Blakiston and Mr. G. Lambert, respectively. Mr. F. Lord, the section's president, in his welcoming address, said that in his belief it was the first time a national president of the Institute had attended a Burnley section dinner. He also welcomed Mr. Beech, the Lancashire branch president.

Both Mr. Blakiston and Mr. Beech replied suitably to the address and Mrs. Blakiston, Mrs. Beech and Mrs. Lord were presented with bouquets by some of the children of members who attended.

It was announced that in future the section will be known as the "North-East Lancashire Section" to take into account its real coverage. The photograph shows—from left to right—Mr. Blakiston, Mr. Lord and Mr. Beech at this function.

Southampton

"Birth of a Bell" was the subject of the November lecture to the Southampton Section of the London Branch of the Institute of British Foundrymen, Mr. G. J. Rogers presiding.

One of the most delightful papers ever to be presented, it was given before an audience of over 70 members and guests by Mr. D. Hughes of Mears & Stainbank, the well-known bellfounders, of Whitechapel, London.

Dealing first with historical aspects, Mr. Hughes commented on the origin and early uses of bells, the development of the now usual bell shapes, early casting methods and examples of early decoration and lettering. Bringing his listeners up to present-day practices, the modern methods of design, casting and tuning; bell uses and methods of hanging, and the repair of old or cracked bells were described and illustrated in the main account. Finally, Mr. Hughes completed his story by quoting interesting details of some world-famous bells, both large and small and answered a number of questions arising from his audience.

ONE OF THE Brush Group of companies, J. & H. McLaren, Limited, Leeds, is making reductions of from £50 to £450 on the prices of its diesel-alternator sets. The measure is designed to beat foreign competition and increase export trade. The new prices will enable the company to adopt a more aggressive sales policy, particularly in competition with Germany.

W. N. Baines' Centenary

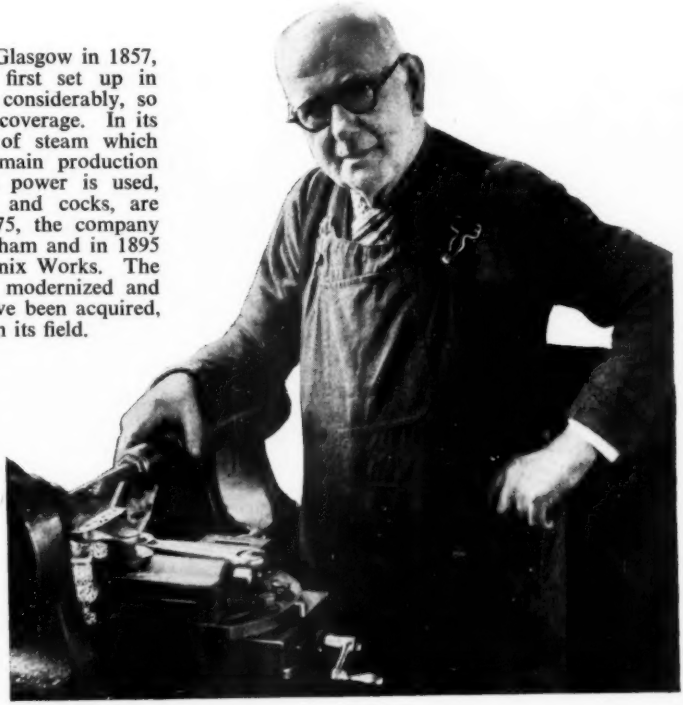
In days of declining "family" businesses, it is pleasing to learn that there are companies in which a family type of relationship between employers and staff still exists. One such is W. N. Baines & Company, Limited, iron and non-ferrous founders, of Rotherham—associated with the Bell's Asbestos and Engineering Group.

At a luncheon given to employees earlier this month to celebrate the centenary of the founding of the company, this family spirit was emphasized in the speech by Mr. H. F. Allen (managing director of Bell's Asbestos and Engineering (Holdings), Limited), when proposing the toast of "The Company." Eighteen members of the present staff have served for periods of over 40 years and the doyen of them all, Mr. W. H. Fletcher, has been in harness for over 67 years, and at the age of 81 has no thought of retiring! Not only is there a creditable record of longevity of service of individuals, the security and benefits offered have induced sons to follow fathers in its employment. Mr. Andrew Thomson, who retired as managing director in 1953 after 52 years' service, had followed his father, who himself had a record of 52 years with the company. These sort of connections are also manifested in present staff, one father-and-son link covering 91 years of the 100 being celebrated.

History

From its modest beginnings in Glasgow in 1857, when William Newbold Baines first set up in business, the firm has expanded considerably, so that it now has world-wide sales coverage. In its early days, it was the coming of steam which provided the company with its main production outlet. To-day, wherever steam power is used, Baines products such as valves and cocks, are renowned for reliability. In 1875, the company moved its headquarters to Rotherham and in 1895 took over its present site at Phœnix Works. The original building has since been modernized and enlarged, and nearby premises have been acquired, until the factory is now a model in its field.

Like so many other old-established foundries, the excellent spirit which is a feature of Baines' working life can be attributed to the personal interest taken by the management in the staff, and to the security which the company offers. However, conservatism alone is not sufficient to enable a business such as this to survive in to-day's competitive world. Thus it is by continual revivification through the introduction of modern equipment and production methods that they are able to celebrate their centenary. There is still a place, however, for the older hand craftsmanship, which is blended skilfully into present-day line-production systems. The association of the firm with Bell's Asbestos and Engineering, Limited, of Slough, is one of long standing, dating back some 70 years. Bell's were originally customers, and later agents of Baines' and in 1949, this association was made permanent when the Rotherham firm entered the group.



"Portrait of a Skilled Craftsman" makes an apt caption for this picture of Mr. W. H. Fletcher who, at the age of 81, has been with W. N. Baines & Company, Limited, for 67 of its 100 years' existence.

INDUSTRIAL WELFARE SOCIETY, Robert Hyde House, 48, Bryanston Square, London, W.1, are organizing a week-end conference for office executives at the Grand Hotel, Brighton, from November 29 to December 2.

WORK HAS RE-STARTED on the construction of Hungary's first experimental magnesium furnace at the Fémtermia Works at the village of Apc, northern Hungary. Until now, all magnesium used in Hungary has been imported. Plans made at the time aimed at producing 600 *tonnes* of magnesium a year by 1960.

British Blast Furnaces in the September Quarter, 1957

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the third quarter, 1957.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Clay Cross Co. (Iron & Foundries)	—	—	1	—	1	1	2
Ford Motor	—	—	—	—	1	1	1
Holwell Iron	—	2	1	—	3	3	4
Kettering Iron & Coal	—	—	1	—	1	1	2
New Cransley Iron & Steel	—	1	—	—	1	1	2
Renishaw Iron	—	—	2	—	2	2	2
Sheepbridge	—	1	—	—	1	1.7	2
Stanton Ironworks: Stanton-by-Dale	—	1	3	—	4	4	5
Staveley Iron & Chemical	—	—	4	—	4	3.9	4
Stewarts and Lloyds: Corby	—	4	—	—	4	3.9	4
Wellingboro' Iron	—	2	1	—	2	2	3
TOTAL	—	11	13	—	24	24.5	31

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel Works	—	1	—	—	1	1	1
Darwen & Mostyn Iron	—	—	—	1	1	1	2
Lancashire Steel Corporation	—	2	—	—	2	2	3
Summers, John	—	2	—	—	2	2	2
TOTAL	—	5	—	1	6	6	8

North-West Coast.

Barrows Ironworks	3	—	—	—	3	3	4
Charcoal Iron	—	—	—	—	—	0.8	1
Millom & Askam Hematite Iron	2	—	—	—	2	2	2
United Steel: Workington	2	—	—	1	3	3	3
TOTAL	7	—	—	1	8	8.8	10

Lincolnshire.

Appleby-Frodingham Steel	—	4	—	—	4	3.6	4
Lysaght's Scunthorpe Works	—	3	—	—	3	3.1	4
Thomas, R., & Baldwins: Redbourn	—	3	—	—	3	3	3
TOTAL	—	10	—	—	10	9.7	11

North-East Coast.

Consett Iron	—	2	—	—	2	2	3
Dorman Long (Steel): Acklam	—	2	—	—	2	2	4
Redcar	—	2	—	—	2	2	2
Bessemer	—	1	—	1	2	2	3
Clay Lane	—	2	—	—	2	2	2
Gjers, Mills	2	—	—	—	2	2	5
Normanby Iron Works	2	—	—	—	2	2	3
Skinningrove Iron	—	2	—	—	2	2	3
South Durham Steel & Iron:							
West Hartlepool	—	2	—	—	2	2	2
Cargo Fleet	—	2	—	—	2	2	3
TOTAL	4	15	—	1	20	20	30

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	1	—	3	3	4
Carron	—	—	1	—	1	1	4
Colvilles: Clyde Works	—	3	—	—	3	3	3
Ravenscraig	—	1	—	—	1	0.7	1
Dixon's Ironworks	—	2	—	—	2	2	6
TOTAL	1	7	2	—	10	9.7	18

South Wales and Monmouthshire.

Briton Ferry Works	1	—	—	—	1	1	1
Guest Keen Iron & Steel: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	3	—	—	3	3	3
Steel Company of Wales: Margam	—	4	—	—	4	4	4
TOTAL	2	9	—	—	11	11	12

Mayor Opens Baths

Although the plans for the new canteen and showerbaths had a rather erratic course through the Halesowen Borough Council when they were first submitted for planning permission, the civic seal was set on the extension to the Eagle Works, of William Whitehouse & Sons (Halesowen), Limited on Friday, November 15, when the Mayor (Councillor P. W. Scott), formally opened the building. It was said that this was the first time in the history of the borough that the leading citizen had opened such a building.

The new building designed by Halesowen architect, Mr. T. S. Beach, comprises a ground floor with baths for the workpeople in the foundry, and upstairs there are canteens for both workpeople and staff, with kitchens.

At the opening ceremony the Mayor, with whom was the Mayoress (Mrs. Scott), was introduced by the general manager of the works, Mr. E. W. Hudson. Others present included the joint directors of the parent company (Sidney Flavell & Company, Limited, of Leamington).

In a vote of thanks to the Mayor, proposed by Mr. Allen and seconded by Mr. Rogers, the latter of whom said the work done in the factory at Halesowen enabled the group to continue to produce some 1,500 to 2,000 cookers each week. The firm of William Whitehouse was acquired by the parent company in 1947. The foundry is used for the production of castings for domestic cookers of all types.

Qualcast-Kaufmann Merger

Details of the Qualcast-Kaufmann merger which will lift the Derby industrial group to a £4 million organization are now before the shareholders of both companies and the terms in simple form are:—

For every four 5s. Ordinary Shares in H. Kaufmann, Limited, Qualcast Limited is offering five of its own 5s. Ordinary Shares.

Qualcast, of course, is well known to readers and when it is realized that the Kaufmann concern incorporates Suffolk Iron Foundry (1920) Limited, which firm operates in the same field as Qualcast, the motive behind the merger becomes clearer. Basically, the Kaufmann business has another side: Fleetway Manufacturing Company, Limited, manufacturers of a wide range of domestic articles and appliances, including carpet sweepers, wringers and woodware.

The present issued Ordinary Capital of Qualcast amounts to £1,177,537 in 5s. shares, which are valued on the Stock Exchange at the current market price of just over 15s. each, rather more than £3½ million. Kaufmann's Ordinary Capital is £312,500 in 5s. shares valued in the market at approximately 18s. a share, or just over £1,125,000 in total. Qualcast has paid a dividend of 24 per cent. each year for the last three years. The Kaufmann dividend for the last two years has been 23½ per cent.

These figures, however, must be judged from the manner in which the businesses, especially Qualcast, have been built up by the judicious re-investment of profits in new factories and plant. Even on the conservative basis of book values Qualcast at June last had £1,036,820 in land, buildings, plant, machinery and equipment. A further £2¼ million was in current assets; on the other side was £794,530 in current liabilities. Kaufmann at end-1956 had just over £250,000 in factories, plant, etc., approximately £1¼ million in current assets, and current liabilities of just over £500,000. Added together the Qualcast-Kaufmann businesses will show £4,019,350 of net tangible assets.

This merger is not just another "take-over" for the sake of building a giant organization. It is likely that both concerns will in the not far distant future have to face the more competitive conditions which the proposed European Free Trade Area must inevitably bring. It is also a fact that in some of their activities the two businesses at present overlap and there is opened the possibility of more efficient production by the joining of forces, especially in the pooling of research and development resources.

British Blast Furnaces in the September Quarter, 1957—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of the third quarter, 1957. Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.	Weekly average in blast.	Total existing at end of quarter.
Goldendale Iron	—	—	1	—	1	1	2
Lilleshall Iron & Steel	—	—	1	—	1	1	2
Round Oak Steel Works	—	—	—	—	—	—	2
Shelton Iron & Steel	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	2	—	—	2	2	3
TOTAL	—	5	2	—	7	7	12
Sheffield.							
Park Gate Iron & Steel	—	1	—	—	1	1	2
GRAND TOTAL	14	63	17	3	97	97.7	134

Weekly Average Number of Furnaces in Blast during the September Quarter, 1957, and the Previous Four Quarters

District.	1956. Sept.	Dec.	1957. March.	June.	Sept.
Derby, Leics., Notts., Northants and Essex	26.6	27	26.1	25.3	24.5
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	6.9	7	6.8	6.6	6
Lincolnshire	9.2	9.1	10	9.7	9.7
North-East Coast	20.2	19.8	19.5	21.1	20
Scotland	9	9	8.5	9	9.7
Staffs., Shrops., Worcs., and Warwicks	7	6.6	7	7	7
South Wales and Monmouth	9.6	10.3	9.9	11	11
Sheffield	2	2	2	1.1	1
North-West Coast	9	8.2	8.6	8.4	8.8
TOTAL	99.5	99	98.4	99.2	97.7

The following companies have furnaces in course of construction or rebuilding:—Lancashire Steel Corporation Millom & Askam Hematite Iron; South Durham Steel & Iron (West Hartlepool); Steel Company of Wales.

First BTH Locomotive for British Railways

First of 10 800-h.p. diesel-electric locomotives built by the British Thomson-Houston Company, Limited, for British Railways was handed over at Euston last week by Lord Chandos, chairman of BTH, to Lord Rusholme, chairman of the London Midland Area Board of the BTC.

For British Railways, the company also has in hand 30 power equipments for 1,160-h.p. locomotives and 40 sets of traction equipment for 3,300-h.p. locomotives which would be built in railway workshops. In addition, BTH is supplying 25 complete electric locomotives of 3,300 h.p. It has pioneered the use of germanium-powered rectifiers and is supplying 35 a.c. multiple-unit motor coaches, the first bulk order by any railway for germanium rectifiers for traction.

Lord Rusholme said the modernization plan was so phased that the delivery of equipment at the right time was of vital importance to its success. "We are looking to diesel and electric traction to provide the economic motive power which will eventually enable British Railways entirely to replace the steam locomotive," he added.

Canadian Trade Mission's UK Tour

Before the Canadian trade mission returns home on December 18 it will have carried out one of the most comprehensive tours planned in the post-war years. The mission, which arrived on November 22, is not only the largest ever sent out by the Canadian Government, but it is the largest trade mission ever to come to the UK from any country.

Over 50 senior representatives of the largest organizations importing into Canada represent many of the principal buying interests, including:—Public utilities (hydro-electric, etc.), oil and gas, constructional work (including pipelines), railways, iron and steel, engineering, pulp and paper, automobiles, shipping, lumbering, chemicals, flour milling, textile machinery, heavy electrical machinery and equipment, and foundry and mining equipment.

In 1956 UK exports to Canada amounted to £178,000,000 and among the main components were:—Non-electrical machinery, £19,200,000; iron and steel, £16,800,000; electric machinery, equipment, and apparatus (including generating sets, generators, motors, electronic valves, radio and TV apparatus, telegraph and telephone equipment), £12,800,000; ships and boats, £10,400,000; chemicals, £8,300,000; and new cars, £7,900,000.

Following conferences with the Board of Trade, the Dollar Exports Council, and leading industrialists on Monday, members of the mission visited the Harwell Atomic Energy Research Establishment, the constructional work on the Berkeley atomic power station, and the Bristol Aeroplane Company, Limited, on Tuesday. The main party went to the Steel Company of Wales, Limited, on Wednesday, and the Minister of Power, Lord Mills, attended a banquet for the mission in Coventry that evening.

In the ensuing days of the visit, small parties are visiting a large number of leading industrial plants in the UK. They include:—

The Automotive Products Company, Limited; the Coventry Gauge & Tool Company, Limited; B.S.A. Tools, Limited; Joseph Lucas, Limited; Rolls-Royce, Limited; Raleigh Industries, Limited; Accles & Pollock, Limited; John Thompson, Limited; the General Electric Company, Limited; Garringtons, Limited; Alfred Herbert, Limited; Bruce Peebles & Company, Limited; Brown Bros. & Company, Limited; the Harland Engineering Company, Limited; Thermotank, Limited; the Pressed Steel Company, Limited; Babcock & Wilcox, Limited; G. & J. Weir, Limited.

The Motherwell Bridge & Engineering Company, Limited; Alexander Stephen & Sons, Limited; Mirrlees, Bickerton & Day, Limited; A. V. Roe, Limited; the Butler Machine Tool Company, Limited; William Asquith, Limited; Brook Motors, Limited; David Brown, Limited; the English Steel Corporation, Limited, and British Thomson-Houston, Limited, and Harland & Wolff, Limited, both of Belfast.

GOLD WATCHES were presented to seven employees of F. Parramore & Sons (1924), Limited, ironfounders and pipe and gutter, etc., manufacturers, of Chapeltown, near Sheffield, in recognition of 30 years' service.

THE 100,000th air-cooled diesel engine made by Petters, Limited, Staines (Middx), was flown out to Beirut on November 20. It will be presented to Dean Weidner, head of the Faculty of Engineering at the American University, Beirut, by Mr. Ian T. Morrow, managing director of the Brush Group, Limited.

Pig-iron and Steel Production

Pig-iron production in October was at the rate of 285,000 tons a week compared with 282,700 tons in September and 260,700 tons a year ago. There was a falling off in demand for foundry pig-iron and in the iron requirements of some steel plants now obsolete, and this led to a certain amount of blast-furnace capacity in the Midlands not being fully employed. For the first 10 months of 1957, production was 8.9 per cent. better than the 1956 average for the similar period. For steel production in October the average was 437,800 tons a week, a slight reduction on the September figure of 438,200 tons, over an increase of 18,700 tons on that for a year ago. The 1957 average production for the first ten months of the year was 5.9 per cent better than the 1956 average for the similar period.

Latest pig-iron and steel output figures (in tons), with the corresponding 1956 returns, are shown in the following table:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1957—August ..	272,500	14,169,000	373,400	19,417,000
September ..	282,700	14,698,000	438,200	22,789,000
October ..	285,500	14,844,000	437,800	22,766,000
First 10 months	274,000	14,246,000	418,000	21,734,000
1956—August ..	235,900	12,265,000	340,600	17,712,000
September ..	252,500	13,131,000	417,000	21,686,000
October ..	260,700	13,558,000	419,100	21,791,000
First 10 months	251,600	13,083,000	394,800	20,528,000

Iron-ore Imports

Iron-ore imports in October, and the totals for the first 10 months of this year and last, are shown below.

From	Month ended Oct. 31.	Ten months ended October 31.	
	1957.	1956.	1957.
	Tons.	Tons.	Tons.
Sierra Leone	103,305	567,831	644,296
Canada	452,800	2,117,587	2,644,131
Other Commonwealth countries and Eire	448	14,366	14,201
Sweden	455,043	3,679,440	3,485,524
Norway	24,540	89,278	215,169
Western Germany	100	3,101	126
France	49,871	506,996	535,086
Portugal	12,335	95,967	119,934
Spain	81,606	711,789	930,838
Algeria	130,472	1,262,485	1,245,842
French West Africa	33,407	512,943	524,821
Tunisia	89,560	679,304	610,808
Northern Morocco	16,280	234,858	200,261
Southern Morocco	36,100	320,322	328,468
Liberia	35,500	291,681	312,649
Brazil	30,840	460,935	574,521
Other foreign countries	141,826	583,595	1,035,003
TOTAL	1,694,033	12,132,478	13,421,678

A £450,000 ORDER for the design and supply of control gates for the Warragamba Dam project in Australia has been secured by Glenfield & Kennedy, Limited, hydraulic engineers, of Kilmarnock. The work will be carried out for the Sydney Metropolitan Water, Sewerage, and Drainage Board. The dam, which is to provide storage and improve the supply of water to Sydney, will generate 50 mw. of electricity.

Foreign Economic Reports

The following extracts have been prepared from recent economic reports emanating from the Export Services Branch of the Board of Trade. In each case an attempt is made to include mention of trends which may influence foundry business.

Argentina: Official trade figures for the first seven months of the year, showed that the position in foreign trade was considerably less favourable than had been hoped for, mainly because free-market exports were only slightly more than estimated whilst imports were much more than expected. Argentine exports to the UK totalled $152,000,000 (US) and imports amounted to $54,000,000. Following the opening of tenders, on September 25, for the El Chocon hydro-electric works on the River Limay, in south-west Argentina, it was found that the only bid for the whole job was by an English/French/Italian group, the British members of which were English Electric Company, Limited, and British Insulated Callenders Cables, Limited.

Belgium: It was reported that the Chamber would be asked to vote on the Common Market and Euratom Treaties immediately on the return of Parliament in the first week of November, and it was expected that the Belgian Parliament will be able to ratify both Treaties before December 1. Belgo-Luxembourg Economic Union exchanges with the United Kingdom produced a substantial balance in the latter's favour. BLEU sales to Britain, at £4,554,000 (c.i.f.) showed little improvement on the June figures, whilst the UK's sales rose to £7,515,000 (f.o.b.) an improvement of £637,000 on the June total. Although further easing of the import/export licensing regulations have been announced it is not expected that these measures will provide material benefit for UK manufacturers or exporters in view of the liberal foreign trade policy now practised by BLEU. According to the June figures Britain occupied fourth position in exports of motor-cars, with the Ford Motor Company in the lead; there was however, a considerable advance in sales of the Vauxhall "Victor." At the 12th International Flanders Fair, held in Ghent in September, 20 countries were represented; 49 exhibitors participated from the UK.

Denmark: Debate is continuing as to whether Denmark should join the European Economic Community or the Free Trade Area. Some of the leading industrialists express caution as to the advisability of joining EEC, and it appears that politicians are veering towards the Free Trade Area. In the shipbuilding industry, it is reported that Burmeister & Wain of Copenhagen, are to enlarge their building capacity by the construction of a new floating dock to take vessels up to 70,000 tons d.w.; in the foundry industry in September production was reduced. The firm of Ulrichs Metalstoberi, a subsidiary of the United Ironfoundries (D.F.J.) stopped production of sanitary fittings, cock and valves, and the Hess foundry at Middelfart, which produced cast-iron stoves, was closed down, and production concentrated at the Hess foundry at Vejle.

Finland: The devaluation of the Finnmark on September 15 by 39 per cent., and the decisions by the Finnish Government which it made possible have completely changed the outlook for the United Kingdom export trade with Finland. Following devaluation, the Finnish Government proposed that from October 1 specified imports from certain countries in Western Europe (including the United Kingdom) be licensed on demand—the goods affected representing some 75 per cent of imports from those sources in 1954—in return for assurances that Finnish exports would receive liberal treatment and that Finland would enjoy certain currency transferability rights in the other countries concerned. The "liberalization list" (published in the Board of Trade Journal of October 4) applies at present to specified imports from the United Kingdom, Austria, Denmark, Belgium-Luxemburg, Western Germany, Netherlands, Norway, Sweden and Switzerland. Other countries may join this group when they give Finland the assurances for which she asked. A more restricted list of "liberalized" imports from the dollar area is expected to be announced later. At the British Trade Fair and Exhibition, held in Helsinki from September 6 to 22, over 500 United Kingdom manufacturers were represented, Exhibitors reported substantial orders, and as the timing of the Fair coincided with the announcement of freer conditions of trade with Finland, representatives of many UK firms were able to discuss new opportunities with agents and customers. The Lord Mayor of London, performed the opening ceremony, the Minister of State, Board of Trade, attended and was the principal speaker at the inaugural banquet given by the Federation of British Industries; there was a full programme of supporting events.

Federation of Malaya: It has been reported that a new iron mine in the State of Kelantan is expected to start production very shortly. The company has joint British, Japanese, and Malayan capital and hopes to be able to produce about 350,000 tons of ore a year in the initial stages. This would bring Malaya's total export of iron ore, most of which is to Japan, to more than 3,000,000 tons a year. For the first time since 1950, when the mining of Columbite began in Malaya, the output of this material seems likely to show a decline.

Norway: The United Kingdom's share of Norway's total imports for the first eight months of this year was 17.4 per cent.; that of Western Germany was 17.0 and the US 11.1 per cent. According to Press reports marine motor engines of 100 h.p. and over and diesel engines up to 700 h.p. may go on the free list of imports at any time; amongst other goods being considered are motor-vehicle bodies, base frames and engines. Statistics published in September show that sales of British cars in the first half of 1957 were more than doubled and the British share of the market rose from 9.5 per cent for the same period last year to 18.5 per cent. this year. On September 8, the Bleikvassli mines, stated to be the largest installation in Norway for the production of lead and zinc concentrates, was opened, and the production has already been sold abroad on long-term contracts. The greater part of the output of the Mosjoen aluminium works, which will come into production at the beginning of 1958, has also been sold abroad for between the next five and 10 years. The Norwegian-Soviet committee of technical experts, who have been examining the possibilities of using the power resources of the Pasvik river along the frontier, have reached agreement on plans for the joint exploitation of the river; their recommendations will be laid before the two Governments.

Latest Foundry Statistics

Light Alloys. During August, the Board of Trade reveals that the production of sand-cast aluminium-alloy castings amounted to 1,365 tons. The output of gravity-die castings was 2,948 tons and that of pressure-die 1,014 tons. The tonnage of magnesium castings was 165 tons.

Company News

ATLAS STEEL FOUNDRY & ENGINEERING COMPANY, LIMITED—The company has declared a final dividend of 1s. 5d. per 5s. unit, making 2s. 1d. for the year to September 30, 1957 (1s. 10d. per unit). Subject to audit, profit is £70,896 (£48,925) after depreciation of £50,000 (£25,000) and tax of £108,200 (£67,000).

ELLIOTT AUTOMATION, LIMITED—The company has purchased the capital of the Rotameter Manufacturing Company, Limited, flow-meter manufacturers, of Croydon, in consideration of the allotment of 269,000 ordinary 5s. shares. The acquired company will remain under the management of Mr. H. R. Trost and Mr. A. H. Trost as joint managing directors and Mr. F. C. Whalen as technical director. The business will continue to operate from the Croydon works.

SOLAR INDUSTRIES, LIMITED (formerly the Aluminium Castings Company, Limited)—A rights issue has been postponed owing to the Bank rate increase. Arrangements for the issue of ordinary capital had reached an advanced stage, but it will not now be made until market conditions improve. On the current year, Mr. R. K. Calder, chairman, says that there has been a distinct improvement over 1956-57, but conditions are so unsettled that it is impossible to venture a forecast of the full year's results.

J. BROCKHOUSE & COMPANY, LIMITED, dropforgers, ironfounders, and trailer manufacturers, etc., of West Bromwich (Staffs)—The company is raising the dividend on its £3,208,170 ordinary stock by 1 per cent. to 8½ per cent. for the year to September 30, 1957, with a final of 6 per cent., against 5 per cent. Group profits increased by over £98,000 to £822,253, and the taxed balance, before overprovision, etc., credits, and outside interests, is up by nearly £67,000 at £391,058. The net balance attributable to the company is £419,740, against £335,636.

COCHRAN & COMPANY ANNAN, LIMITED, boilermakers and engineers, of Annan—Mr. Robert Adeane, chairman, informed shareholders that for the first four months of this year the company had done well. It was hoped that the 12 months' turnover would approximate to last year's, but longer term prospects did not appear to be so good. The company should continue, however, to make fair profits. Orders for the shipbuilding industry, a most important industry to the company, were likely to decrease over the next few years. The credit squeeze, also, was beginning to affect them. A one-for-four scrip issue is proposed and has been approved.

ALLIED IRONFOUNDERS, LIMITED—The company is maintaining its interim ordinary dividend for the year to March 31, 1958, at the reduced 3¼ (5) per cent. rate paid for 1956-57. An unchanged final of 8¾ per cent. made 12½ per cent. for last year, compared with 13¾ per cent. previously. The directors report that sales and profits of the group for the first half of the year are running at approximately the same level as last year, after taking account of the losses incurred by the Australian subsidiary. Since the close of the half-year to September 30, there has been a welcome improvement in the Australian company's production and efficiency, they add.

HERBERT MORRIS, LIMITED, lifting and transporting machinery manufacturers, of Loughborough (Leics)—According to the chairman, Mr. F. Morris, the volume of orders on hand exceeds that of last year, and productive capacity is limited only by delays in obtaining certain materials and by a scarcity of skilled labour. Indications are that trading conditions generally in the engineering industry are likely to become more difficult, but the directors hope that the current year's results will compare favourably with those for the year ended July 31, last. In 1956-57 group trading profits rose from £819,482 to £1,048,010 with the distribution repeated at 25 per cent., tax free.

THOMAS BLACKBURN & SONS, LIMITED, structural and general engineers and ironfounders, of Preston—The ordinary dividend is cut from 15 per cent. to 5 per cent. for the year to June 30, 1957. Group trading profit is £51,055, against £82,055, and the net profit £4,812, against £24,223, after depreciation, etc., but before tax of £2,020 (£15,200). Processes of development and reorganization have been completed, and this, coupled with the nature and extent of the current order-book, is expected to bring an early improvement in earnings. There were considerable losses in the grey-iron castings section, and to meet this situation the foundry at Bamber Bridge, Preston, has been substantially redesigned and re-equipped.

CROMPTON PARKINSON, LIMITED—The unexecuted order-book of the group is in excellent condition, according to the chairman, Mr. A. Parkinson. Referring to the proposed one-for-two free scrip issue, he says that since the capital was last enlarged three years ago the group's activities have increased very considerably, and with widening and growing interest in nuclear and electronic engineering, as in many other fields, this is fully expected to continue. Consolidated net income exceeded £1,000,000 for the first time in 1956-57, amounting to £1,059,247, against £996,002. While the increase is not large, it is pointed out, the result reflects an increased turnover which has had to absorb continually rising costs. The ordinary distribution is held at 16 per cent.—the previous year's total included a 6 per cent. bonus, but the directors have decided not to continue bonus payments.

DUPORT, LIMITED, domestic equipment and engineering accessory manufacturers (formerly Vono Industrial Products, Limited, Tipton)—The final dividend is 20 per cent., making 25 per cent., less tax, on the £1,873,675 ordinary capital, for the year to July 31, 1957. Similar payments were made on smaller capital, prior to shares issued against acquisitions, for 1955-56. CIC consent has been obtained for a proposed one-for-one scrip issue and the directors foreshadow the payment of a 12½ per cent. total—an interim of 5 per cent. and a final of 7½ per cent.—on the enlarged capital for 1957-58. Group profits have contracted from £1,804,132 to £1,566,064. The directors point out that the truly comparable figure for the previous year including Revo Electric Company, Limited, Tipton, and a full year for the Briton Ferry Steel Company group would be approximately £2,000,000.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

AUSTRALIA, February 28, 1958—110-ton travelling gantry crane (ESB/27037/57.)

IRAN, December 9—Fork-lift trucks. (ESB/27263/57.)

IRAQ, December 7—Spun-iron pipes and special castings. (ESB/27115/57.)

PAKISTAN—Nawa-i-Waqt Publications, Limited, Queens Road, Lahore, wish to receive quotations for printing and paper converting machinery. (ESB/27042/57.)

UNION OF SOUTH AFRICA, December 5—Traffic Signal Head Assemblies. (ESB/27398/57.)

UNION OF SOUTH AFRICA, December 13—Vacuum and steam gauges. (ESB/27753/57.)

Publications Received

"Men and Machines." Published by Walter Nurnberg, 18, Cornwood Close, London, N.2.

This is a collection of 44 industrial photographs taken by the publisher. They are of a very high order of artistic merit and such excellence must have been achieved by a careful study of lighting, the angle of the camera and the posing of operators. The reviewer esteems picture No. 26 as the best; it shows a man cleaning a brewery copper, and the dominant feature of the photograph is not the man but his shadow. Mr. T. H. Summerson has written the preface (in his usual brilliant fashion), in which he puts industry in its proper perspective *vis-à-vis* the ephemeral events which are made the subjects for illustration in the daily Press.

Melting Practice for Aluminium Castings. Published by Alar, Limited, 3, Albemarle Street, London, W.1.

It is now about six years since this booklet was first issued and this second edition has been brought right up-to-date. It is an excellent, reliable and easily understandable handbook, and one which can safely be placed in the hands of a foundry foreman. The subject matter includesv, after a general introductory statement, furnaces and equipment; melting precautions—a chapter containing a wealth of useful tips; temperature control—a more important factor than is often realized; grain refining; fluxing and degassing. Finally, there is a chapter on the modification of the aluminium/silicon alloys. This book, which runs to 52 well-illustrated pages, is available to readers, free of charge, on application to ALAR. Even if it had been priced at half a guinea, its purchase would still have been very strongly recommended.

Book Reviews

Zirconium (Second Edition) by G. L. Miller, PH.D. Published by Butterworths Scientific Publications, 4 & 5, Bell Yard, London, W.C.2, or in the USA by Academic Press Inc., 111, Fifth Avenue, New York 3. Price 71s. 6d. post free, or $12.50.

This is the story of a metal which was first isolated in an impure brittle form in 1824, and produced in small quantities as a ductile material in 1925. W. J. Kroll, the "Father of Zirconium," evolved a manufacturing process in 1945, and the development of nuclear energy has made great demands for the element, which in 1949 was selected as the structural material for the US submarine Thermal Reactor. It is for this reason that the volume under review is included in the present series of works on the rarer metals.

The first edition of the book appeared in 1954 but the release of much "classified" information has now justified this second edition, which replaces some previous doubtful information by well authenticated results, and keeps pace with the rapid development of the metal and its alloys. A whole chapter is devoted to melting practices, and this should make stimulating reading for the foundry technologist. Zirconium melts at 1,850 deg. C. and the liquid is not only extremely reactive towards many gases but also to most of the ordinary container materials. The furnace atmosphere must therefore be free from the common gases, and arc melting in water-cooled copper crucibles is found to give a minimum of contamination. Novel methods such as "float melting" (levitation), "drip melting" and "auto-crucible melting" are also described. Vacuum and pressure casting methods have been devised for zirconium and the results obtained indicate that the production of small precision castings is a definite possibility. This section of the book is well illustrated and is largely based on the techniques used for titanium; in fact pages 440-450 read as though they were dealing with this metal itself.

The alloys of zirconium and their phase diagrams are described in 60 pages, and there is an appendix on the difficult metallography of the metal. The book does not appear to contain a single micrograph showing the structure of zirconium or its alloys. Amongst special features to be noted is the fact that zirconium nitride has a micro-hardness of 1983 kg. per sq. mm. and yet its electrical conductivity is better than that of the pure metal, with a hardness of 90 kg. per sq. mm.

The book is excellently produced in the uniform manner of this series, and gives complete references to the literature of the subject. Its 550 pages are packed with up-to-date information, and this is critically dealt with by an expert author, who has worked with the metal both in Britain and the USA.

HUGH O'NEILL.

Fachkunde für Former, second edition (Science for Moulders) (in German), by L. Frede. Published by Verlag Julius Beltz, Weinheim, A.D. Bergstrasse, Berlin, S.W.61; price 8.50 DM.

This little book is addressed to those concerned with the actual production of castings and aims to present, by means of a simple text and a large number of diagrammatic sketches, the basic principles of foundry science which stem from the fundamental sciences of physics, chemistry, and applied mechanics. The theoretical text is accompanied by descriptions of a number of simple experiments. In addition, an outline is given of some of the chief topics of materials testing and metallurgy. The result is a most interesting combination of theory and practice which should go a long way in helping the practical German-speaking foundryman, unable to attend formal instruction, to gain an acquaintance of the natural laws underlying his craft.

J. E. GARSIDE.

House Organs

Steel Horizons. Published by Allegheny Ludlum Steel Corporation, Pittsburgh, Pennsylvania.

This excellently-produced and magnificently coloured publication contains interesting articles on subjects varying from the production of model electric trains to the use of stainless steel for a man-made satellite. The article in this issue of special interest to foundrymen, however, is a description of the Wallace Expander—an appliance plant specially designed for the mass production of large sheet-metal parts. In the article it is stated that all the major die parts were cast-to-shape to eliminate as much machining as possible. Illustrations of a punch-and-die bowl-cavity for forming a sink top and a trim-and-pierce die for the back panel of a refrigerator are included.

Sif-Tips, Vol. 24, No. 99; issued by the Suffolk Iron Foundry (1920) Limited, Stowmarket.

The major article of foundry interest in this issue is the repairing of a 3-cwt. cast-iron booster pump by welding. The replacement time quoted was six months, and as the pump had to deliver 1½ million gallons of water a day, the urgency of the job can be appreciated. A solution was provided by gas welding, using the well-known Sifbronze process.

CHILEAN iron-ore production in 1956 reached the record figure of 2,400,000 tons, 1,000,000 tons more than in 1955. Exports increased by 600,000 tons.

Personal

Mr. W. KITA, M.SC., has been appointed chief metallurgist and steelfoundry manager, with Leopold Lazarus, Limited, Birmingham.

A Buchanan book prize of the Institute of British Foundrymen has been awarded to Mr. P. J. BUTLER who passed the final examination in the first class in patternmaking at Sheffield College of Technology this year.

City Casting & Metal Company, Limited, non-ferrous ingot manufacturers, Barford Street, Birmingham 5, announce that Mr. H. O. WELLS has been appointed representative for the Birmingham, Black Country, Potteries and East Midlands area.

That he was never late for work is the proud claim of Mr. THOMAS MORTON, aged 74, who has just retired after 61 years with Geo. Salter & Company, Limited, the last 25 as a foreman, at the Spon Lane foundry. Three generations of the Morton family have served the company.

Guest, Keen Iron & Steel Company, Limited, announce the appointment of Mr. A. J. BODDINGTON as Birmingham office manager in succession to Mr. F. H. NEAL. Mr. Boddington, who joined the company in 1948, was on the Birmingham office staff as pig-iron sales representative from 1949 to 1956 and has recently been assistant to the chief buyer at Cardiff.

The first occupant of the newly-created Chair of Metallurgy at Oxford University is Dr. WILLIAM HUME-ROTHERY, the present George Kelley Reader in Metallurgy at Oxford, a post which he has occupied since October, 1955. Creation of the Chair results from the endowment of £65,000 for that purpose by Mr. Isaac Wolfson, chairman of Great Universal Stores, Limited.

The Council of the Institution of Production Engineers announce the award of the 1957 Schofield travel scholarship to Mr. J. D. PARSON, a 29-year-old senior methods production controller at Solartron Engineering, Limited, Thames Ditton, Surrey. He proposes to spend three months in the United States of America studying manufacturing techniques of small electro-mechanical mechanisms.

For the first time for over 80 years, W. Shaw and Company, Limited, steelfounders, of Middlesbrough, are without a moulder from the Heward family on their books. Air Commodore FINLAY CRERAR, joint managing director, made a presentation at the firm's Wellington foundry, Middlesbrough, to Mr. JOHN HEWARD, whose retirement on reaching the age of 65 severs this old family link. He was presented with a wallet of notes from his workmates, and a cheque from the directors.

Mr. GEORGE C. PARKER, managing director of the Caledon Shipbuilding & Engineering Company, Limited, Dundee, was elected president of the Shipbuilding Employers' Federation at the annual meeting in Edinburgh on November 15. He succeeds Mr. JOHN HUNTER, chairman of Swan, Hunter & Wigham Richardson, Limited. Mr. Parker joined the Dundee firm in 1928 as assistant shipyard manager and in 1932 he became shipyard manager. In 1938 he was made a director of the company and in 1949 was appointed managing director.

The directors of Ley's Malleable Castings Company, Limited, honoured 80-year-old Miss ALICE KEETING, a cleaner who has worked for the firm for 73 years, on Saturday, November 16. She started when she was seven, in 1884, helping her mother to make buns and coffee for the workmen every morning. She still walks the two miles from her home in Gordon Street, Derby, to begin her work of cleaning at five o'clock in the morning. She has known four generations of the Ley family, and on November 16, the directors sent a car for her and took her to a dinner being held for a member of the family.

Mr. H. P. POTTS has joined the board of directors of the Colchester Machinery Corporation, Limited, of Toronto, Montreal and Vancouver, which is associated with the Colchester Lathe Company, Limited, of Colchester, Essex. Both are members of the 600 group of companies. Mr. Potts is one of the leaders of the engineering industry, being immediate past-president of the Machine Tool Trades Association, and a member of the European Committee for the Co-operation of the Machine Tool Industries. He is a director of the Birmingham Small Arms Company, Limited; chairman of B.S.A. Guns, Limited, and of Monochrome, Limited; and managing director of the B.S.A. Tools group of companies.

Obituary

Mr. ROBERT EDGE, who has died at the age of 61, was for many years a technical librarian, at Stanton Ironworks Company, Limited, near Nottingham.

Mr. GORDON S. FRASER, former chairman and managing director of Douglas Fraser & Sons, Limited, textile engineers and ironfounders, of Arbroath, has died at the age of 78.

Mr. GERARD SWOPE, former president of the General Electric Company, and the International General Electric Company, died at his home in New York on November 22. He had been honorary president since 1944. Mr. Swope was 84.

The death is reported of Mr. DAVID GAMMANS at the age of 90, father of the late Sir David Gammans, Bart., M.P., and proprietor of the firm of George Cash and Company, Limited, ironfounders, Aylward Street, Portsmouth, with which he was connected for over 40 years. He was a former member of Portsmouth City Council for more than 15 years.

The death took place on November 11 of Mr. P. M. PARISH while on holiday in Gibraltar. Mr. Parish joined Frys Metal Foundry in 1913 soon after the inception of the business and took a leading part in the development of this company, Frys Diecastings, Limited, and the Eyre Smelting Company, Limited. When Mr. John Fry retired in 1947 Mr. Parish was appointed chairman. He retired on reaching the age of 65 less than a year ago.

Mr. ERIC EASON, former works manager at the Redcar works of Dorman, Long & Company, Limited, Middlesbrough, has died at the age of 54. He had been ill for some time. Mr. Eason joined the company in 1927, working in the engineering department at the Britannia Works. After being appointed works manager there, he was transferred to the Redcar works in 1943 where he became works manager in 1952. He was a member of the council of the Cleveland Institute of Engineers.

The death has occurred at the age of 78 of Mr. JOSEPH WILLIAM COOPER, who, until his retirement in 1945, was a director of Charles D. Holmes & Company, Limited, engineers, founders, and boilermakers, of Hull. He served his apprenticeship with the company and was associated with it for 60 years. He continued to serve in a consultative capacity until his death. He designed the machinery for the "Mersey" class of minesweepers in the first world war and in the second was made an MBE for his work on vessels of the trawler type.

News in Brief

ENGLISH STEEL CORPORATION, LIMITED, Sheffield, is to be visited by members of a trade mission of the Canadian Government on December 6.

THE SHEFFIELD WORKS SPORTS ASSOCIATION'S indoor trophy was presented to Edgar Allen & Company, Limited, on November 21 for the fifth successive year.

BARCLAYS BANK reports from its Accra office that the Ghanaian subsidiary of a London metal company is to establish an iron and steel industry and rolling mill at Aboso.

SHORT-TIME WORKING is to be introduced by the Sheepbridge Company, Limited, Chesterfield, where a modern blast furnace now undergoing modification is to be allowed to remain idle for the time being.

TWO 11,950-TON MOTOR SHIPS have been ordered from Bartram & Sons, Limited, Sunderland, by the Court Line, Limited, London, E.C.3. The order is worth £2,000,000. The ships are due for delivery in 1962-63.

MILLSPAUGH, LIMITED, Sheffield, have received a £500,000 order for a pulp machine, a paper-making machine and preparatory plant for Portuguese West Africa. The order was secured against strong German competition.

MORE THAN 350 PEOPLE attended the annual Ball of Herbert Morris Apprentices' Association, which was held in the Essoldo Ballroom, Loughborough. The guests included Mr. H. Purnel, vice-chairman of the board of directors, and a number of other directors.

LEC REFRIGERATION, LIMITED, founders and engineers of Bognor, Sussex, announce that production has commenced of their 2-cub. ft. refrigerator, the "Coronet." At present the firm is turning out 400 per day, but hopes to increase this figure to 550 in the near future.

LANDMASTER, LIMITED, Hucknall, Notts., are offering a reward of £1,000 for information leading to the recovery of plans for agricultural tractor hoes. The plans have been missing since last August and are thought by the firm to have been stolen. The police are continuing their investigations.

THE MAIN IRON FOUNDRY of Birmid Auto Castings Pty., Limited, Geelong, Australia, was formally opened by Sir Dallas Brookes, the Governor-General of Victoria, last week. The aluminium foundry and iron foundries are already producing on a small scale and serious production is expected to start up next year.

IN CONTINUATION of similar work earlier undertaken for the Hawker Siddeley Nuclear Power Company, Limited, Burness, Corlett & Partners, Limited, has been appointed consultant naval architects, for project work, to Hawker Siddeley-John Brown Nuclear Construction, Limited.

THE New York State Power Authority announced on November 20 that the British-controlled firm of Ferranti Electric Incorporated had won a $3,925,250 (about £1,401,000) contract to supply 13 transformers for the main plant of the Niagara Falls power project. The authority said the Ferranti offer was the lowest of eight received.

THE LARGEST SINGLE ORDER for main-line diesel locomotives yet placed for British Railways with one firm has been placed with the North British Locomotive Company, Limited, Glasgow. It consists of 52 diesel-hydraulic locomotives of 1,000 h.p. each, and it brings the value of the orders on the company's books for this type of locomotive alone to more than £5,000,000.

IT IS LIKELY that a playground site in the Pollokshaws area of Glasgow will be made available to John McDonald & Company (Pneumatic Tools) Limited, for the relocation of their premises. The future location of another firm in the area, Compressor Services, Limited, is still being considered by the local authority pending consultations between the firm and the city architect and planning officer.

FOUNDRY SERVICES (OVERSEAS), LIMITED, will in future operate as Foundry Services International, Limited. The board will comprise:— Dr. K. Strauss; Mr. E. Weiss; Dr. D. V. Atterton; Mr. G. E. Cobby; Mr. R. D. Hume; Mr. R. A. Miller, and Mr. D. A. Patterson. Foundry Services, Limited, will continue to operate as formerly, but Mr. A. G. T. Chubb and Mr. J. C. Noon have joined the board.

THE CLEANLINESS of the factories of Leyland Motors, Limited, and the safe conditions under which employees worked, was praised by Judge Allan Walmsley, Q.C., at a judgment case at Preston County Court. When a workman described the Leyland workshops "as clean as this court-room," the Judge commented: "That must be a tribute to the court for the factory has been described as the cleanest in the country."

MEMBERS of a Chinese economic and technical mission; Mr. Kuo Li (deputy director and chief engineer of Chang Chun Automobile Factory), and Mr. Kang Tieh-chun, deputy director of the Tientsin Industrial Research Laboratories and a member of the Chinese Society of Chemical Engineers recently visited the Southampton works of Leicester, Lovell & Company, Limited, where they saw, *inter alia*, the application of epoxide resins for patterns and coreboxes.

THE EUROPEAN MEMBERSHIP of the *Bureau International de la Récupération* is responsible for over £150,000,000 of international businesses each year This figure purely refers to the inter-change of materials between countries. To give an example of what is being done in home markets, it is perhaps sufficient to say that in the United Kingdom, the iron and steel scrap industry alone supplies appreciably more than £50,000,000 worth of material to the British iron and steel industry in a year.

A DEVELOPMENT will take place early in the new year in the manufacture of materials handling equipment in Scotland. So far Scotland's share of this highly important industry is still very small, and most of the fork-lift trucks, stackers and pallets have to be brought from England. About seven years ago the firm of T. P. S. Products began the manufacture of battery electric transporters, trucks, stackers, trailers and hydraulic ramps at High Blantyre. Now they are about to move into a new 7,000 sq. ft. factory at East Kilbride.

THE KILMARNOCK FIRM of Glenfield & Kennedy, Limited, hydraulic engineers, have secured, against world competition, a £450,000 order for the design and supply of control gates for the Warragamba Dam project in Australia. The work will be carried out by the Sydney Metropolitan Water, Sewerage and Drainage Board, New South Wales. The dam is being built on the Warragamba River to provide storage to improve the supply of water to Sydney. It will generate 50 megawatts of electricity, and will have a limited measure of flood control.

RICHARD SUTCLIFFE, LIMITED, mining engineers, Horbury, have been unable to secure the deferment from National Service of 21-year-old Brian Chadwick, the winner of their Apprentice of the Year award which carries with it a year's visit to Switzerland. The company has decided to send in his place, 20-year-old

News in Brief

David Jenkinson, an apprentice plater, who will spend a year at Sulzer Bros., engineering works, in Winterthur, studying tne engineering methods of that country. Sutcliffe's will send Brian Chadwick on completion of his National Service.

BRADLEY & FOSTER, LIMITED, of Darlaston, Staffs, have just completed a £35,000 canteen capable of seating 200 work people. It is a two-storey building with the canteen, the board room and a dining room for senior staff on the first floor. The ground floor is furnished with well-appointed kitchen stores and all the other ancillary departments required by the modern works canteen. The new building has a double purpose in that, apart from its main function as a canteen, it will be used for social occasions, and for the reception of visitors to the works.

ROCK FOUNDRY, a branch of W. H. Kane & Company, of Larne, County Antrim, closed down on November 22; 40 tradesmen and apprentices were declared redundant. A spokesman for the firm said that the foundry had not been in full production for some time but it is hoped by reorganization within the main foundry in Larne to re-employ some, if not all, the men and boys. For 40 years, the Rock Foundry has been producing agricultural machinery and implements. The main foundry will continue to manufacture whatever agricultural machinery and implements there is a demand for.

Changes of Names

Among companies which have recently changed their names are those listed below. The new titles are given in parentheses.

BOWKERS, LIMITED, engineers, etc., of 75, Charles Street, Sheffield (Bowkers Holdings, Limited).

CRAWLEY STEEL COMPANY, LIMITED, 13, Harold Road, London, S.E.19 (White & Bushell (Steels), Limited).

JOHN LEVICK, LIMITED, engineers, etc., of Alma Street, Aston, Birmingham, 6 (Leelick Holdings, Limited).

MACKENZIE CONSTRUCTION, LIMITED, 33, Cork Street, London, W.1 (Mackenzie Engineering (Overseas), Limited).

VANRIX, LIMITED, engineers, etc., of Prudential Buildings, Park Row, Leeds, 1 (Steele & Cowlishaw, Limited).

YORATH-LEWIS BOILERS, LIMITED, 80, Coleman Street, London, E.C.2 (Lewis Water Tube Boiler Company, Limited).

ENGINEERING SUPPLIES (STOCKPORT), LIMITED, 142/4, Camberwell New Road, London, S.E.5 (Pullen & Mase, Limited).

AIR KING EXPORT SALES COMPANY, LIMITED, air-conditioning plant, etc., manufacturers (Air King Export Sales, Limited).

WILLIAM WRIGHT (RANGE BOILERS), LIMITED, 37, Chatham Street, Liverpool, 7 (Wright (Metal Fabrications), Limited).

FRETNIC ENGINEERING, LIMITED, Castle House, 79, King Street, Leicester (Machine Components (Leicester), Limited).

S. HAROLD & COMPANY, LIMITED, 23, Augusta Street, Birmingham (Porter Prototype Engineering (Birmingham), Limited).

INGLIS KNIBB & COMPANY (ENGINEERS), LIMITED, 20/21, Tooks Court, Cursitor Street, London, E.C.4 (Miniscrews, Limited).

COOPERS NEEDLE WORKS, LIMITED, 263/5, Aston Lane, Perry Barr, Birmingham, 20 (Coopers Needle Works (Redditch). Limited).

STEELE & COWLISHAW, LIMITED, engineers, etc., of Cooper Street, Hanley, Stoke-on-Trent (Steele & Cowlishaw (Hanley), Limited).

CULGAITH BRICK & TILE COMPANY, LIMITED, The Brickworks, Culgaith, Cumberland (Culgaith Engineering Company, Limited).

GESTITE ROLLERS, LIMITED, manufacturers of rollers for printing or other machines, of 41, Fairley Road, London, N.17 (Portlic, Limited).

STOCKS (1920), LIMITED, mechanical and general engineers, motor engineers, etc., of 8/10, Newland, Lincoln (R. M. Wright (Boston), Limited).

HEWITT & WESTON, LIMITED, agricultural and general engineering contractors, etc., of 21, Gildredge Road, Eastbourne (John L. Weston, Limited).

TOLWORTH PRECISION DISTRIBUTORS, LIMITED, precision turners, etc., of 27, Albemarle Street, London, W.1 (Ridgway Engineering Distributors, Limited).

Birmid Chairman Attacks Nationalized Industries

In his address to shareholders, the Marquess of Exeter, chairman of Birmid Industries, Limited, producers of alloys and castings, etc., of Smethwick (Staffs), criticizes the nationalized industries. A recent pronouncement of "advanced thinkers" that directors of limited companies were a law unto themselves and that shareholders had no power to control them was sheer nonsense, he states. By contrast the shareholders in nationalized industries had not the shadow of power or opportunity to call anyone to account or influence the management of those industries in any way at all.

"One would imagine that the failure of nationalization contrasted with private enterprise in productive industry is apparent now even to the most prejudiced. Constantly rising costs in the nationalized industries are passed on to the helpless public without redress, right of appeal, or fear of competition.

"The precarious state of the national finances demands, in my view, that every chance should be taken to proclaim these basic economic truths, however trite and oft-repeated they may be," the chairman remarks.

Hopes that the new Nuneaton iron foundry would be fully productive by the end of the year to July 31, 1957, were not realized owing to delivery delays and teething troubles. Nevertheless, an output of over 1,000 tons per month was reached in the first 12 months and the rate was expected to be doubled during the current year.

Although group net profits fell to £912,717 (£1,488,659), the results are not considered unsatisfactory in view of the various adverse factors involved. To a large extent heavy depreciation charges on modernization and re-equipment and increased costs for labour and materials were absorbed. The ordinary distribution is held at 17½ per cent. with a 7½ per cent. bonus.

Foundry plans a Move

So near to "bursting at the seams" is a Bridgtown, Cannock, firm of ironfounders that it is seeking a new factory. As reported in this JOURNAL recently, the firm, E. W. Wynn (Ironfounders) Limited, have been refused permission to build a foundry on a site at Spinny Farm, Wolverhampton Road, Cannock, but the company still hopes to stay within the Cannock Urban District. Mr. W. T. Roberts, general manager and director, said that the move had been forced on them because of tremendous expansion resulting in serious overcrowding.

The firm, one of the Cincinnati Milling Machines, Limited, group, makes grey-iron machine-tool castings. The present building is about 80 years old, and formerly belonged to Whitehouse Brothers. It was bought by Mr. E. W. Wynn, founder of the Bridgtown firm, in 1936, and Wynn's became part of the Cincinnati combine in 1950. In the last seven years, Mr. Roberts stated, money had been poured into the factory, to bring it as up to date as possible. The point had now been reached, however, where it was pointless spending any more, and a move was the only solution. He added that the new factory, to be built on modern lines, would employ probably twice as many workers as the 330 now at Bridgtown. New laboratories, welfare facilities and workshops were part of the plant. One of the biggest benefits the firm would get from its new home is an expansion of its apprenticeship scheme.

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Raw Material Markets

Iron and Steel

Current outputs of pig-iron are providing consumers with adequate supplies and only in the low-phosphorus grades is demand approaching production. Basic pig-iron, which has for a long period been in heavy demand by the steelworks, still continues to be sufficient to meet their needs both for consumption and stock requirements. If necessary, increased tonnages could be forthcoming.

With imported supplies appreciable, stocks are now held by the steelworks and this has resulted, in some instances, in a curtailment of deliveries from home sources. Outputs from home furnaces have been reduced by the suspension in production of the basic pig-iron from two furnaces and restricted outputs from other units, while the necessity for further imports has been removed.

In the foundry pig-irons, the low-phosphorus grades continue to be absorbed in appreciable quantities by the engineering and speciality foundries and producers are able to distribute practically the whole of their makes without much difficulty. These foundries are also taking up good tonnages of hematite, and no difficulty is experienced in obtaining this grade.

High-duty castings are in good demand, but the call for castings requiring the use of high-phosphorus pig-iron continues quiet and is reflected in a moderate demand. Outputs have recently been increased, but consumption is below normal and producers continue to add to stocks. The light, jobbing, and textile foundries have capacity available, which is difficult to fill with the meagre amount of business available. The export orders which are being received are relieving the furnaces of some of their stocks of both hematite and the high-phosphorus irons, but competition from overseas makers, who also have tonnages to spare, is keen.

The foundries have plentiful supplies of scrap. The heavier and better grades of cast-iron scrap are being taken up, but there is very little demand for the medium and light grades. Foundry coke is being delivered in fairly good quantities, generally sufficient to satisfy consumption needs, but there is little to spare in both the Welsh and Durham grades. Ganister, limestone, and firebricks are received to requirements.

The re-rollers maintain fairly good outputs, but many establishments could undertake a much larger volume of work, particularly for small bars and light sections. Plentiful supplies of steel semis are available to meet any increased demands; in fact, larger tonnages could be supplied. Under the present economic conditions, the re-rollers are refraining from booking further tonnages until present stocks are cleared. The steelworks find it difficult to dispose of their arisings of defectives and crops which are accumulating at the works.

Non-ferrous Metals

Growing doubts as to whether resources in the hands of the buffer stock manager are sufficient to prevent the cash price of tin falling below the "floor" price of £730 a ton has been responsible for the price of three months' metal declining sharply. The position is that spot supplies are plentiful and have been augmented by exceptionally heavy buying from Malaya during the past month or so. Activity in the London market has been brisk, with a high turnover reported, a large proportion of which is believed to be cash tin being bought by the buffer stock. Under the terms of the international tin agreement the buffer stock manager must support the cash price at £730 a ton.

How much tin the manager has bought to date is not known, but at the end of June last his total was 4,000 tons, which meant that he could purchase a further 9,000 tons before running out of funds. However, when he has accumulated 10,000 tons he has the right—unless the International Tin Council decides differently—to demand a further 5,000 tons, or its equivalent in cash, at £730 a ton, and also to impose export quotas. It is thought that both these measures will be discussed when the council meets in London on December 4. Meanwhile fears in New York that the council may reduce the "floor" price for buying has resulted in the quotation falling to around 87 cents a pound.

Copper continues weak in London and is quiet in New York. In London the price is vulnerable, not only through lack of any real consumer buying interest, but also because most of the "bears" have now covered. The late Sir Ernest Oppenheimer and Sir Ronald Prain both spoke last week as chairmen of Rhoanglo and RST groups, respectively; neither spokesman gave any indication as to when the price of copper would recover, although both reaffirmed their confidence in the long-term outlook for copper. In the United States the price structure received a further jolt when the custom smelter price was lowered a further ½ cent to 25 cents a pound. Producers are holding their price at 27 cents a pound, but scrap is now selling at 19½ cents and copper for export at 24½ cents a pound.

Lead is quiet in London, with buying of a routine nature, and it is thought that the contango may soon be eliminated. In the US production is falling off and, in September, production was the lowest since mid-1948, when strikes resulted in a low monthly output. The US price is steady at 13½ cents a pound.

Zinc is stronger than lead, with support continuing to come from the automobile industry. In America the price is still called 10 cents a pound.

More Collaboration Requested

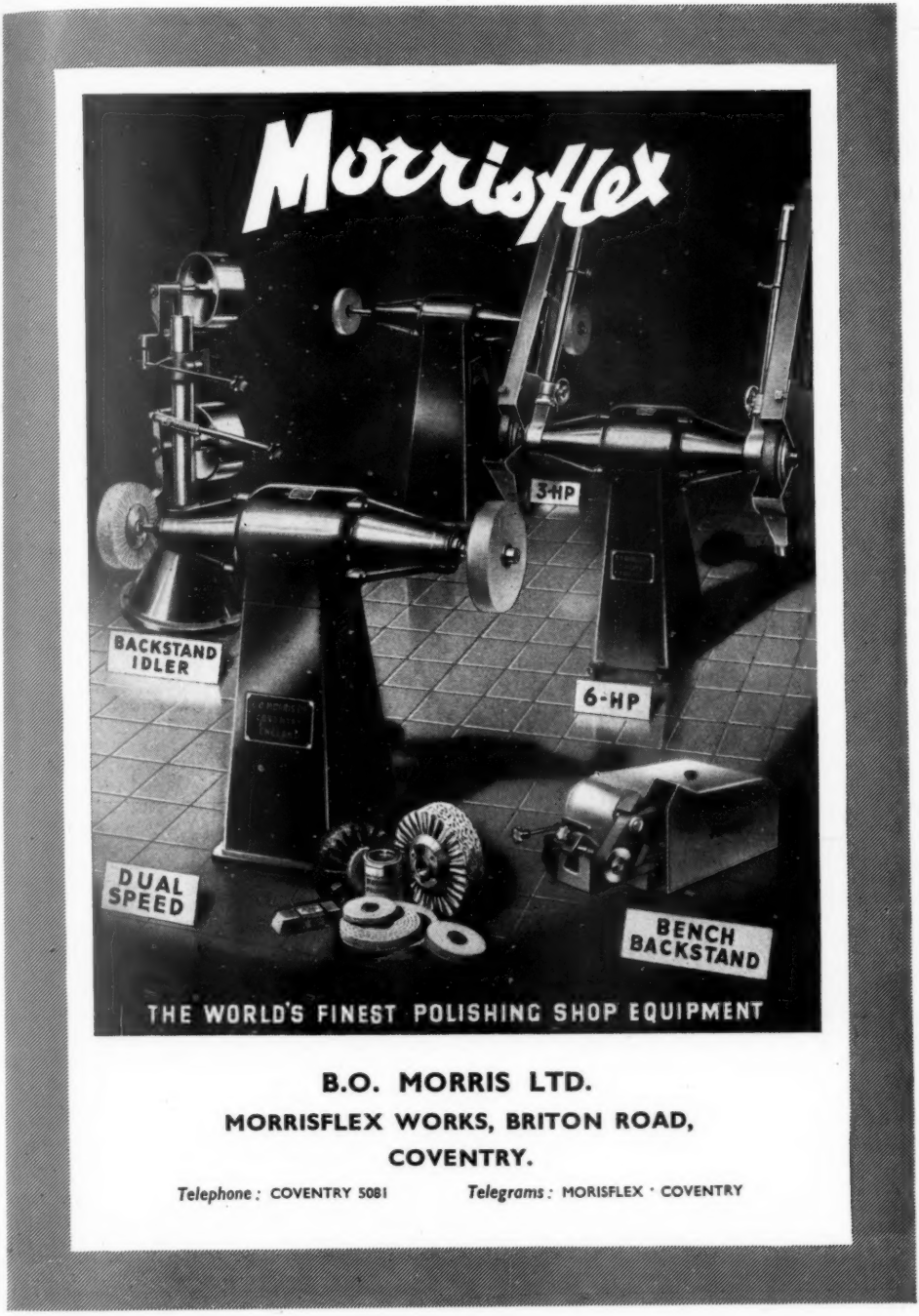
Need for still closer collaboration between the metallurgist and light metal producers was emphasized by Lord Chandos, chairman of Associated Electrical Industries, Limited, when he addressed the Light Metal Founders' Association last week. Without the metallurgical advances of this century the work of the aircraft designer and aerodynamic engineer could not be turned into aircraft of present-day performance, he said.

In the development of gas turbines, the years from 1933 until the war were largely spent in metallurgical research and this was only one example of almost countless uses into which the skill and research of the association entered.

Referring to the "nuclear and Sputnik mood," Lord Chandos said that it required no imagination to see the part which light metals and their alloys must play, if we are to take up and outface the challenge of our new age.

Vitreous Enamelling of Aluminium

At a meeting of the Southern section of the Institute of Vitreous Enamellers to be held at the Howard Hotel, Norfolk Street, London, W.C.2, on Wednesday, December 4, at 7.15 p.m., Mr. A. J. Biddulph, of Ferro Enamels, Limited, will present his paper entitled "The Enamelling of Aluminium." (When this paper was abstracted in the JOURNAL—November 21, 1957—mention should have been made of Mr. Biddulph's indebtedness to his firm for facilities granted for its preparation; apologies are recorded for this omission to both author and his firm.)



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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

November 27, 1957

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S. 1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £50 0s. 0d. to £52 15s. 0d., scale 17s. 0d. to 17s. 6d. per unit; 75 per cent. Si, £70 0s. 0d. to £76 7s. 6d., scale 17s. 0d. to 17s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 28s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £299 0s. 0d.

Ferro-tungsten.—80/85 per cent., 9s. 2d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 12s. 2d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £96 0s. 0d. to £99 10s. 0d., basis 60 per cent. Cr, scale 33s. 0d. per unit; over 6 per cent. C, £94 0s. 0d., basis 60 per cent. Cr, scale 31s. 0d. to 33s. 0d. per unit; 2 per cent. C,* 2s. 2d. per lb. Cr.; 1 per cent. C,* 2s. 2½d. per lb. Cr; 0.15 per cent. C,* 2s. 3d. to 2s. 3½d. per lb. Cr; 0.10 per cent. C,* 2s. 3½d. to 2s. 3¾d. per lb. Cr; 0.06 per cent. C,* 2s. 3¾d. to 2s. 4d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 3d. to 7s. 10¼d. per lb.

Metallic Manganese.—90/92 per cent., carbon-free, £290 0s. 0d.; 96/98 per cent., £310 0s. 0d.

Ferro-columbium.—65/75 per cent., Nb + Ta, 22s. 0d. to 23s. 0d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £87 19s. 3d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £33 1s. 6d.; tested, 0.08 to 0.33 per cent. C, £34 1s. 6d.; hard (0.41 to 0.60 per cent. C), £35 3s. 0d.; silico-manganese, £44 2s. 6d.; free-cutting, £37 5s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 7s. 0d.; silico-manganese, £44 10s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 16s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 18s. 6d.; acid, up to 0.25 per cent. C, £43 10s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 12s. 0d.; boiler plates (N.-E. Coast), £45 2s. 0d.; floor plates (N.-E. Coast), £44 1s. 0d.; angles, N.-E. Coast, £40 6s. 6d.; joists, N.-E. Coast, £40 2s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats, 5 in. wide and under, untested soft basic, 50 tons and over, £40 8s. 0d. (under 10 tons to 4 tons, £41 5s. 6d.; under 4 tons to 2 tons, £41 10s. 6d.); hoop and strip, coils, £40 10s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £45 16s. 0d.; black sheets (hand mill), 24 g., 59 4s. 6d.; galvanized corrugated sheets, 24 g., £68 0s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £69 9s. 6d., nickel-chrome, £100 12s. 6d.; nickel-chrome-molybdenum, £112 16s. 6d.

NON-FERROUS METALS

Copper.—Cash, £183 0s. 0d. to £183 10s. 0d.; three months, £187 5s. 0d. to £187 10s. 0d.; settlement, £183 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 1s. 9⅝d. per lb.; rods, 209s. 9d. per cwt. basis; 20 s.w.g., 243s. 0d. per cwt.

Tin.—Cash, £730 0s. 0d. to £730 10s. 0d.; three months, £700 0s. 0d. to £701 0s. 0d.; settlement, £730 10s. 0d.

Lead (Refined Pig).—Second half November, £78 10s. 0d. to £78 15s. 0d.; second half February, £79 5s. 0d. to £79 10s. 0d.

Zinc.—Second half November, £65 15s. 0d. to £66 0s. 0d.; second half February, £65 10s. 0d. to £65 15s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £110 15s. 0d.; rolled zinc (boiler plates), all English destinations, £98 10s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £89 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 6d. per lb.; sheets to 10 w.g., 161s. 6d. per cwt. wire, 2s. 3½d.; rolled metal, 161s. 6d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £137; B6 (85/15), — ; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £179; HTB2 (38 tons), £195; HTB3 (48 tons), £210.

Gunmetal.—BS1400, LG2 (85/5/5/5), £168; LG3 (86/7/5/2), £179; G1 (88/10/2/½), £236; (88/10/2/1), £226

Phosphor Bronze.—BS1400, PB1 (AID released), £250 per ton.

Phosphor Bronze Strip, etc.—Strip, 242s. 9d. per cwt.; sheets to 10 w.g., — per cwt.; wire, 3s. 7½d. per lb.; rods, 2s. 10¾d.; tubes, 2s. 10½d.; chill cast bars: solids 2s. 10½d., cored 2s. 11½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 6d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 10¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 9¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £69 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £197 0s. 0d.; aluminium bronze (BS1400), AB1, £207; AB2, — .

* Average 68-70 per cent.